Annual Compliance Report No. 28

Fiscal Year 2022–2023

(July 1, 2022, to June 30, 2023)

National Pollutant Discharge Elimination System (NPDES)
Municipal Separate Storm Sewer System (MS4)
Discharge Permit No. 101314

Prepared for:

Oregon Dept. of Environmental Quality

Submitted by:

City of Portland
Port of Portland

Date:

November 1, 2023

CITY OF PORTLAND
ENVIRONMENTAL SERVICES
1120 SW Fifth Ave, Suite 613, Portland, Oregon 97204 ▪ Mingus Mapps, Commissioner ▪ Dawn Uchiyama, Director

November 1, 2023

Pablo Martos
MS4 Permit Manager
Oregon Department of Environmental Quality
700 NE Multnomah St, Suite 600
Portland, OR 97232

Dear Mr. Martos:

The City of Portland and the Port of Portland are pleased to submit the enclosed *NPDES Annual Compliance Report No. 28* for fiscal year (FY) 2022-23. This report fulfills reporting requirements for the Portland Group's NPDES Municipal Separate Storm Sewer System (MS4) Discharge Permit No. 101314. It provides information about activities that were accomplished in accordance with the co-permittees' current DEQ-approved Stormwater Management Plan Documents from July 1, 2022 through June 30, 2023. The report describes stormwater activities in accordance with MS4 permit requirements.

Each co-permittee's section of the report (Part I for the City of Portland and Part II for the Port of Portland) details the activities implemented, program status, and any initiated or proposed program changes. A Monitoring Report summarizing the monitoring activities and results is included as Part III.

Please email me at loren.shelley@portlandoregon.gov if you have any questions concerning this report.

Sincerely,

L. Shelley

Loren Shelley
MS4 & TMDL Program Manager

cc: Andrea Matzke, Oregon Dept. of Environmental Quality
Blake Hamalainen, Port of Portland

Portland, Oregon
National Pollutant Discharge Elimination System
Municipal Separate Storm Sewer System Discharge Permit
Permit Number: 101314

ANNUAL COMPLIANCE REPORT

Fiscal Year 2022–2023
(July 1, 2022 – June 30, 2023)

We, the undersigned hereby submit this annual compliance report for the Municipal Separate Storm Sewer System Discharge Permit No. 101314, in accordance with Schedule B, Section 5 of that permit. We certify, as required by 40 CFR Section 122.22, under penalty of law, that this document was prepared under our direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on our inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of our knowledge and belief, true, accurate, and complete. We are aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Dawn Uchiyama

Digitally signed by Dawn Uchiyama
Date: 2023.10.30 16:30:22 -07'00'

10/30/2023

Dawn Uchiyama
Director, Bureau of Environmental Services
City of Portland

Date

10/19/2023

Dan Pippenger
Chief Aviation Officer
Port of Portland

Date

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Executive Summary

This 28th *Annual Compliance Report* submitted to the Oregon Department of Environmental Quality (DEQ) fulfills reporting requirements for the National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Discharge Permit #101314 (referred to as the "MS4 permit" or "permit"). DEQ issued this permit to the City of Portland and the Port of Portland (the co-permittees) on September 15, 2021, and it became effective on October 1, 2021.

This report provides information about activities conducted by the co-permittees in accordance with their respective 2022 Stormwater Management Program (SWMP) Documents during fiscal year (FY) 2022–23, from July 1 through June 30, also referred to as the "reporting period." It also includes a Monitoring Report that summarizes sampling and monitoring activities conducted during the reporting period (Part III). The co-permittees independently submitted updated SWMP Documents to DEQ on November 1, 2022, in accordance with permit requirements. DEQ approved both the City's and the Port's SWMP Documents on December 16, 2022.

The City of Portland continued implementation of all stormwater program elements described in the DEQ-approved SWMP Document during FY 2022-23. The City continues to experience ongoing challenges related to the pandemic, including a slow economic recovery. The City also faces new hurdles that ultimately impact our future ability to deliver stormwater programs and services at current levels. While the City continues to meet and exceed permit requirements, adaptive management of the SWMP will be necessary and is discussed in Part I of this report.

The Port of Portland has been able to meet or exceed all SWMP targets during FY 2022-23. The Port has worked hard to maintain operations through the COVID-19 pandemic and while effects of the pandemic are still evident, full recovery is anticipated. The Port expects to continue with implementation of the activities listed in their SWMP document through the permit cycle.

Accomplishments, challenges, and adaptive management of stormwater program implementation are noted in detail and discussed in each co-permittee's respective report if and where appropriate.

Permit History

DEQ issued the first MS4 permit to the City and other co-permittees within the Portland urban services boundary (USB) on September 7, 1995. DEQ renewed the permit for a second permit term in March 2004 and subsequently revised and reissued that permit on July 27, 2005. The co-permittees submitted a permit renewal package to DEQ on September 2, 2008, and DEQ subsequently issued the third-term permit on January 31, 2011. The co-permittees submitted a renewal package to DEQ on July 31, 2015, for the fourth permit term. The 2011 permit expired on January 30, 2016, and was administratively extended until the fourth term permit was reissued September 15, 2021, with an effective date of October 1, 2021.

Permit Areas

The permit areas for the co-permittees are as follows:

- **City of Portland:** Approximately 15,231 acres within the City of Portland's USB drain to the City's MS4.
- **Port of Portland:** The Port owns approximately 5,478 acres within the City of Portland's USB. Much of this property drains to the Port's MS4 and is regulated by the MS4 permit. Port property includes (1) Aviation, (2) Marine, (3) Business Parks, and (4) Undeveloped Property.[1]

Program Coordination

The City and Port coordinate regularly to share information about program development and implementation, BMP effectiveness, monitoring, and other issues related to the MS4 permit. This coordination avoids duplication and promotes cost-effective use of resources. To further ensure ongoing collaboration and efficiency, the City and Port have an intergovernmental agreement that allocates responsibilities and resources.

The City and Port also coordinate and address stormwater permit implementation issues with other jurisdictions in the state through the Oregon Association of Clean Water Agencies (ACWA). City and Port representatives participate in ACWA's water quality, stormwater, and groundwater committees.

[1] The Port's undeveloped properties within the USB include wetland and grassland mitigation sites, natural areas, and vacant tax lots.

Document Organization

The following table (Table E.1) outlines the organization of this annual report document, with respect to the 2021 NPDES MS4 annual reporting requirements per Schedule B.3 of the permit.

The City's annual report and associated deliverables due to DEQ on November 1, 2023, are included in this document as Part I. The Port's NPDES MS4 annual report is included as Part II. The collective monitoring annual report is included as Part III.

Table E.1: NPDES MS4 Annual Reporting Requirements for Permit Year 28 (FY 2022–23)

	Location in Document	
	City of Portland	**Port of Portland**
a) Status of implementing SWMP elements, including progress in meeting Measurable Goals and program tracking and assessment metrics.	Part I, Section 2	Part II, Section 7.1.1 through 7.1.9
b) Summary of the adaptive management implementation and any changes or updates to programs made during the reporting year, including new BMPs.	Part I, Section 3	Part II, Section 8.0
c) Any proposed changes to SWMP program elements to reduce TMDL pollutants to the MEP.	NA	Part II-8.0
d) A summary of education and outreach and public involvement activities, progress toward or achievement of measurable goals, and any relevant assessment of those activities.	Part I, Section 2	Part II, Section 7.1.1
e) A summary of the number and nature of enforcement actions, inspections, and public education programs, including results of ongoing field screening and follow-up activities related to illicit discharges.	Part I, Section 2	Part II, Section 7.1.1 through 7.1.9
f) A list of entities referred to DEQ for possible 1200-Z NPDES general permit coverage based on co-permittee screening activities, a list of categories of facilities inspected, and an overview of the results of inspections of commercial and industrial facilities.	Part I, Section 2	Part II, Section 1.0
g) A summary of total stormwater program expenditures and funding sources over the reporting fiscal year, and those anticipated in the next fiscal year.	Part I, Section 1	Part II, Section 4.0
h) A summary of monitoring program results, including monitoring data that is accumulated throughout the reporting year and submitted in the DEQ-approved Data Submission Template and any assessments or evaluations of that data completed by the co-permittees or an authorized third party.	Part III	Part III
i) Any proposed modifications to the Monitoring Plan necessary to ensure that adequate data and information are collected to conduct stormwater program assessments.	An updated Monitoring Plan was approved by DEQ on Dec. 16, 2022.	
j) An overview, as related to MS4 discharges, of concept planning, land use changes, and new development activities that occurred within the UGB expansion areas during the previous year, and those forecast for the following year, where such data is available.	Part I, Section 1	Part I, Section 1, and Part I, Section 10
k) The details of all corrective actions implemented that are associated with Schedule A.1.b.iii during the reporting year.	NA	Part II, Section 9.0
l) Additional submittals per Schedule B.3.l that are due November 1, 2023. • Review and update of dry-weather screening location prioritization criteria. • Update, if necessary, an escalating enforcement procedure for the Construction Site Runoff Control program. • Low Impact Development/Green Infrastructure (LID/GI) strategy. • Updated Industrial/Commercial Facilities Strategy. • Infrastructure Retrofit and Hydromodification Assessment Update.	Part I, Section 1[a]	Part II[b]

BMP=best management practice; DEQ=Oregon Department of Environmental Quality; MEP=maximum extent practicable; MS4=Municipal Separate Storm Sewer System; NA=not applicable; NPDES=National Pollutant Discharge Elimination System; SWMP=Stormwater Management Plan; TMDL=Total Maximum Daily Load; UGB=Urban Growth Boundary.

a. The LID/GI Strategy and Infrastructure Retrofit and Hydromodification Assessment Update are included in Appendices to the City's report (Part I). The additional deliverables are discussed in the Introduction portion of the City's report.

b. The Port's LID Strategy, Storm water System Enforcement Rules (Final Draft), and Retrofit and Hydromodification Assessment are included as Appendices to the Port's report (Part II).

PART I
CITY OF PORTLAND

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Acronyms and Abbreviations

ACWA	Oregon Association of Clean Water Agencies
BDS	City of Portland Bureau of Development Services
BES	City of Portland Bureau of Environmental Services
BMP	best management practice
BPS	City of Portland Bureau of Planning and Sustainability
City	City of Portland, Oregon
CMOM	capacity, management, operations, and maintenance
DEQ	State of Oregon Department of Environmental Quality
EPA	U.S. Environmental Protection Agency
ESCM	Erosion and Sediment Control Manual
IDDE	Illicit Discharge Detection and Elimination
IGA	Intergovernmental Agreement
IPM	integrated pest management
ISW	Industrial Stormwater Program
LID	low-impact development
MIP	Maintenance Inspection Program
MS4	municipal separate storm sewer system
NEC	No Exposure Certification
NPDES	National Pollutant Discharge Elimination System
O&M	operations and maintenance
PBOT	City of Portland Bureau of Transportation
PCC	Portland City Code
PF&R	City of Portland Fire and Rescue
PP&R	City of Portland Parks and Recreation
ROW	right-of-way
SMF	stormwater management facility
SWMM	Stormwater Management Manual
SWMP	Stormwater Management Program
TMDL	Total Maximum Daily Load
UIC	underground injection control

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1 Introduction

This annual report fulfills reporting requirements of the City of Portland's National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Discharge Permit Number 101314. The report represents the City's Stormwater Management Program (SWMP) activities that occurred during the 2022 to 2023 fiscal year, from July 1 through June 30, abbreviated as FY 2022–23.

The City's NPDES MS4 permit was renewed on September 15, 2021, and listed as effective on October 1, 2021. An updated SWMP Document reflecting the new permit requirements and updated reporting schedule was submitted to the Oregon Department of Environmental Quality (DEQ) on November 1, 2022. The SWMP Document was approved by DEQ December 16, 2022. The permit, SWMP Document, and associated reports can be accessed on the City's MS4 website.

Annual reporting requirements related to program authority, urban growth expansion, and stormwater expenditures/funding sources are described below in Section 1. Details about stormwater program activities conducted during the reporting period are detailed in Section 2. A summary and details of adaptive management changes are discussed in Section 3. Monitoring activities conducted pursuant to Schedule B of the permit are included in Part III of this report.

1.1 Program Authorization

Portland City Council passed a resolution in June 1995 supporting the City's NPDES MS4 permit application. In that resolution, the Bureau of Environmental Services (BES) was designated as the lead for the City's implementation of the MS4 stormwater program. The City continues to maintain and update legal authority to implement the programs outlined in the SWMP Document, as originally demonstrated in Part 1 of the 1991 NPDES MS4 permit application.

1.2 Urban Growth Boundary Expansion Areas

There were no changes to the Urban Growth Boundary within the City's MS4 area during the permit year.

1.3 Stormwater Funding Sources

The Portland City Council approves revised stormwater monthly user fees and stormwater system development charges (SDCs) at the start of each fiscal year. Rate adjustments are based upon cost-of-service principles, thereby ensuring equity by charging ratepayers and developers according to the amount of sewer and drainage service they use.

1.3.1 Stormwater Monthly User Fees

Monthly user fees are adjusted to reflect operating, maintenance, and capital costs of the City's sanitary sewer and drainage system. Table 1.1 reports the monthly single-family stormwater management charge and the monthly stormwater rate per 1,000 square feet of impervious area. Table 1.1 also includes the anticipated monthly stormwater management charge and stormwater rate for the next fiscal year (2023–24).

1.3.2 Stormwater System Development Charges

Portland's SDCs are assessed for new development and significant redevelopment based on two components: (1) onsite runoff management — the charge for stormwater facilities that handle runoff from individual properties, and (2) public right-of-way (ROW) runoff management — the cost of stormwater facilities that handle runoff from public ROWs. Riparian properties that drain directly to the Columbia Slough, Columbia River, or Willamette River are eligible for 100% credit for the onsite portion of the fee. The ROW portion of the fee is assessed based on the use of the transportation system, using road frontage and vehicle trips associated with the proposed development.

Table 1.1 summarizes the actual and anticipated SDC fees based on both components. Discounts may be granted only for the "onsite" part of the charge for facilities constructed as part of new development. Discounts range from 80% for retention of the 100-year event to no discount for control of the 10-year storm.

Table 1.1: Stormwater Management and SDC Charges and Rates over the Permit Term

Stormwater Monthly Charges and Rates		2010–11	2022–23	% Change	Adopted 2023–24*
	Single-Family Residential Charge	$21.79	$31.20	43.2	$32.45
	Residential Rate ($/1,000 sf impervious area)	$9.08	$13.00	43.2	$13.52
	Nonresidential Rate ($/1,000 sf impervious area)	$9.66	$13.46	39.3	$14.10
SDC Charges and Rates		**2010–11**	**2022–23**	**% Change**	**Adopted 2023–24***
	Onsite Portion ($/1,000 sf)	$154.00	$259	68.2	$259
	ROW Portion ($/linear foot of frontage)	$4.78	$8.36	47.9	$8.36
	ROW Portion ($/vehicle trips)	$2.51	$4.67	86.1	$4.67

ROW=right-of-way; SDC=system development charge; sf=square foot.

** 2023–24 rates were adopted May 2023.*

1.4 Stormwater Program Expenditures

The City of Portland has invested more than $2 billion in stormwater management services since the original MS4 permit was issued.

Revenue requirements for FY 2022–23 totaled approximately $210.0 million. In FY 2023–24, the City plans to invest $210.0 million in stormwater management services and facilities, which reflects the updated cost-of-service results. Direct monthly user fees will pay for 78% of these investments.

1.5 Additional Reporting Requirements

The City successfully completed a number of additional items required by the permit to be submitted with the FY 2022-23 annual report, as described below.

1.5.1 Prioritization Criteria for Dry-Weather Screening Locations

In accordance with Schedule A.3.c.v of the permit, the City reviewed and updated the criteria by which priority monitoring locations will be selected for future dry-weather screening activities. The updated selection process uses a combination of risk factors to determine locations, including specific characteristics of City MS4 outfall basins. These characteristics include land use, impervious area, landscape features, and past dry-weather screening inspection information. Implementation of dry-weather screening using the new criteria is expected to begin in the summer of 2024, and the SWMP Document will be updated as necessary.

1.5.2 Escalating Enforcement Procedure for the Construction Site Runoff Control Program

Schedule A.3.d.v of the permit requires continued implementation and maintenance of a written escalating enforcement and response procedure that addresses repeat violations through a progressively stricter response for all qualifying construction sites. The permit states that if "*the escalating enforcement procedure already in place does not meet these requirements, a revision or update must be submitted with the Annual Report due November 1, 2023, and, if necessary as specified under Schedule A.2.f, added to the SWMP Document at that time.*"

As described in the DEQ-approved 2022 SWMP Document, the City's updated Erosion and Sediment Control Manual (ESCM) and associated ordinance outlines the City's escalating enforcement process for the Construction Site Runoff Control, or "Erosion Control" Program.

In October 2022, Portland City Council adopted changes to the Portland City Code, Title 10: Erosion and Sediment Control Regulations, after years of intense work by City staff and experts to bring City erosion control policies up to current and best standards. The updates moved many of the provisions relating to specific requirements and standards from Title 10 to the ESCM. These changes provided clarity, consistency, and ease of administration. The Enforcement Fee and Penalty Schedule added escalating enforcement fees and fines for noncompliance with Title 10 and the ESCM. Details can be found on the City's Erosion Control website, and no further amendments to the SWMP Document are necessary at this time.

1.5.3 Low Impact Development/Green Infrastructure Strategy

Schedule A.3.e.ii of the permit states:

> *The co-permittees must, by November 1, 2023, review and update or develop and begin implementation of a strategy to require to the maximum extent feasible, the use of Low Impact Development and Green Infrastructure (LID/GI) design, planning, and engineering strategies intended to minimize effective impervious area or surfaces, and reduce the volume of stormwater discharge and the discharge of pollutants in stormwater runoff from development and redevelopment projects. This LID/GI strategy must be documented in the subsequent Annual Report and incorporated into or referenced in the SWMP Document after completion and DEQ approval.*

Section 2.5 of the City's SWMP Document describes, in detail, a strategy for post-construction site runoff from new and redevelopment. That strategy, in the form of the City's Stormwater Management Manual, employs comprehensive LID and GI design, planning, and engineering principles and policies. While Section 2.5 and associated references therein largely meet the permit's LID/GI requirement cited above, the City has drafted a specific LID Strategy that augments the SWMP Document. The LID Strategy is included as Appendix A of this report and will be incorporated into the City's SWMP Document as appropriate after DEQ approval.

1.5.4 Updated Industrial/Commercial Facilities Strategy

Per Schedule A.3.g.ii of the permit:

> *The co-permittees must by November 1, 2023, at minimum, review and update as appropriate the Industrial/Commercial Facilities Strategy developed under the previous permit term and include it in the SWMP Document directly or by reference. The Strategy must be posted on the co-permittees' websites for public comment for a minimum of 30 days prior to submission to DEQ for approval and incorporation into the SWMP Document. If the Strategy Document is completed early, wholly incorporated into the SWMP Document, and submitted to public review with the initial SWMP Document, this suffices for the public review requirement.*

Section 2.8 and Appendix D of the City's SWMP Document describes, in detail, a strategy to prevent and reduce pollution in stormwater runoff from industrial and commercial facilities. The strategy includes details on the following:

- Facility types that the City has determined may have high potential to discharge pollutants of concern to the MS4;

- Inspection procedures, documentation standards, and frequency of inspections; and
- A description of the assessment and tracking of compliance with municipal ordinances related to discharges to the MS4 at industrial and commercial facilities that are potential sources of pollutants in stormwater runoff.

Prior to DEQ approval in December 2022, the SWMP Document was publicly posted for the required 30 days, and the City conducted extensive outreach to solicit community feedback. During the reporting period, the City's MS4 Program Manager and Industrial Stormwater Program Manager conducted a subsequent review of the strategy detailed in Section 2.8 of the SWMP Document and concluded that it fully meets Schedule A.3.g.ii of the permit. Therefore, no additional deliverables or modifications to the SWMP Document are necessary at this time.

1.5.5 Infrastructure Retrofit and Hydromodification Assessment Update

Schedule A.3.h of the permit states:

> *The co-permittees are required to include in the third Annual Report of this permit term, an assessment of any outcomes related to the [previous permit's] Hydromodification Assessment and Stormwater Retrofit Strategy reports.*

BES's integrated planning experts conducted a comprehensive review of the previous permit's Retrofit and Hydromodification deliverables, submitted to DEQ in 2014, and compiled a report on lessons learned from and since those efforts were originally conducted. The assessment/report per Schedule A.3.h of the current permit is included as Appendix B.

1.6 Adaptive Management

The City's formal adaptive management approach includes two key elements: (1) an **annual process** to ensure that the City's stormwater program is being implemented in accordance with the SWMP Document, to evaluate progress toward meeting metrics and milestones, and to assess whether any programmatic adjustments or modifications to the SWMP Document are needed; and (2) a **comprehensive process** submitted as part of the City's permit renewal package that includes the modification, addition, or removal of BMP strategies and associated metrics and milestones in the SWMP Document.

Adaptive management results from the FY 2022-23 annual process are described in Section 3 of this report, which includes necessary SWMP Document modifications identified.

2 Stormwater Management Program Activities

The City's SWMP Document includes detailed descriptions of strategies implemented to reduce the discharge of pollutants from the MS4 to Portland's waterways. It also includes reporting metrics (milestones) as well as other reportable items to align program activities with each strategy. Select reporting metrics are intended to be reported annually to evaluate trends and program effectiveness.

Annual reporting metrics and program activities for FY 2022-23 are outlined in Tables 2.1 through 2.8 in accordance with the following strategies as defined in the SWMP Document.

- Public Education and Outreach Strategy (see Table 2.1)
- Public Involvement and Participation Strategy (see Table 2.2)
- Illicit Discharge Detection and Elimination (IDDE) Strategy (see Table 2.3)
- Erosion Control Strategy for Construction Site Runoff (see Table 2.4)
- Post-Construction Site Runoff Strategy for New and Re-Development (Table 2.5)
- Post-Construction Long-Term Operation and Maintenance Strategy (Table 2.6)
- Pollution Prevention and Good Housekeeping Strategy for Municipal Operations (Table 2.7)
- Industrial and Commercial Facilities Strategy (Table 2.8)

Metrics and other reportable items may be adjusted over time as new insights are gained, new goals are created, or in accordance with the City's adaptive management process (Section 3). Specific metrics and program activities subject to adjustment are identified in Tables 2.1 through 2.8 with a check in the Adaptive Management column.

Table 2.1: Public Education and Outreach Activities

SWMP Strategy	Reporting Metric	2022-23 Activities	Adaptive Mgmt.
2.1.1 General Environmental Outreach			
	Annual GovDelivery engagement rate	The average GovDelivery engagement rate was 63%.	
	Number of social media "likes"	BES received 694 "likes" on Facebook (the number of likes received in the FY 21-2022 reporting period was 704). The number of BES likes remains consistent (a 1.4% decrease). BES discontinued use of the BES Twitter (now X) account and is using the platform only to disseminate urgent public advisory notifications.	✓
2.1.2 Clean Rivers Education Programs			
	Deliver 400 educational programs annually	343 Clean Rivers educational programs were delivered to Portland area students. School bus transportation was limited for much of the academic year due to driver shortages and substantially elevated transportation costs, which resulted in BES's inability to meet the milestone of 400 education programs served.	✓
	Summarize challenges and accomplishments, partnership highlights, and work done in concert with historically underserved students and schools	**Achievements** • Developed partnerships with equity-priority organizations and BES staff from multiple work groups to provide 19 career-based field and classroom programs. Staff with expertise in natural area restoration, water quality monitoring, engineering, green infrastructure maintenance, and stormwater and wastewater taught students about their work and career paths. • Partnered to engage elementary students and high school peer mentors in hands-on restoration of a local natural area. The program enabled high school students to complete graduation requirements while gaining valuable work experience. • Continued to develop web-based resources for educators for background information, student research, and curricular extensions. Recorded 2,998 Clean Rivers Education webpage page views by 1,345 users. **Challenges** • Schools continue to rebuild from pandemic challenges; some schools were slow to schedule programs. • Bus transportation was limited for much of the academic year due to school bus driver shortages, reducing the ability to meet the metric of 400 education programs served. Additionally, school bus transportation costs increased substantially this year.	
	Coordinate with regional educators on identification and development of equity-based metrics	Clean Rivers Education developed equity-based metrics after consulting with regional educators to address BES's equity goal of delivering at least half of its programs to schools or organizations that meet any of the equity criteria described below. **Title I-funded schools** • Schools with over 50% of students participating in the federally assisted Free and Reduced Lunch program. • Schools with over 50% Combined Historically Underserved students (only Portland Public School District publishes this data). • Community-based education organizations that center on unhoused, communities of color, and/or culturally specific students. During the FY 2022-23 reporting period, equity criteria was met as follows: • 59% of Clean Rivers Education programs were delivered to groups and schools meeting equity criteria. • 74% of student field trip transportation funding was spent on groups and schools meeting equity criteria.	

Table 2.1: Public Education and Outreach Activities (continued)

SWMP Strategy	Reporting Metric	2022-23 Activities	Adaptive Mgmt.
2.1.3 Regional Clean Water Partnership			
	Description of annual participation efforts in regional clean water partnerships	**Clean Rivers Coalition.** The City participates in the statewide Clean Rivers Coalition, which uses funds from participating jurisdictions to support the "Follow the Water" public outreach campaign, providing the "why" for clean water, sharing water-related values and ties to Northwest cultural identity, and the importance of clean water to communities. The City's participation in FY 2022–23 included a $5,000 sponsorship contribution supporting website design and maintenance, outreach campaign tools, and digital advertising focusing on values-based storytelling and residential pesticide use reduction. **Regional Coalition for Clean Rivers and Streams.** The City participates in "The River Starts Here" campaign with other NPDES permit holders in the Portland metropolitan area to help residents make informed home and automobile care decisions that reduce stormwater pollution and improve watershed health. The campaign features local restoration and clean-up events, profiles of diverse local organizations, and tips for clean water around the home. The City's participation in FY 2022–23 included a $5,000 sponsorship to support online tools and community events. **KPTV Campaign.** The City participated in and contributed to the development and delivery of the "Clean Water–It's Our Future" campaign with a group of regional clean water partners. The campaign comprises a series of public service announcements (PSAs), social media posts, banner ads, and website content focusing on practical advice for implementing clean water practices such as alternatives to herbicide use and keeping storm drains clear. The PSAs air during KPTV news segments, and complementary information is posted on the KPTV Community webpages and shared via Facebook posts. The City participated in the development of messages and contributed $5,000 to this campaign in FY 2022–23. The PSAs aired throughout the year in the Portland metropolitan area.	
2.1.4 Household Waste & Recycling			
	Description of annual outreach related to household waste and recycling	The following activities were conducted during the reporting period (description by media type and delivery method): • Web pages on recycling – what goes in the bin, recycling at home, at apartments and multifamily complexes, and businesses. Topic: Focus is on the specific location of recycling (residential, multifamily, or commercial) and provide instructions on recycling opportunities, requirements, and material lists. These web pages also provide tips and instructions on material preparation as well as printable resources and Bureau of Planning and Sustainability (BPS) contact information. • Annual printed 4-page mailer called Curbsider sent to approximately 200,000 residences. Topic: What materials go into which bin (compost, recyclable materials, and garbage), why compost food scraps, lists of accepted and not accepted materials, instructions on how to handle "other wastes" (used oil, e-waste, etc.), collection schedules and reminders, and recycling and reuse options for bulky materials. • Green Living Journal publication in spring, summer, fall, and winter of 2023. Topic: Directing online subscribers to community resources, offering correct recycling practices, focusing on the issue of "tanglers" and the need for those items (rope, cord, chains, hoses) to go in the garbage. • Tabling during FY 2022-23 outreach season. Events included: Fix-it-Fairs (Jan. 28 and Mar. 4, 2023), Good in the Hood (June 2023), City of Portland Immigrant & Refugee Program Welcoming Week (Sept. 2022), Division Midway Alliance Festival of Nations (Sept. 2022), and East Portland Sunday Parkways (Aug. 2022). Topic: BPS staff provided outreach materials and participated in tabling events, supporting program kits such as Eat Smart Waste Less, Be Cart Smart, Recycle or Not, and Resourceful PDX to educate about waste prevention and encourage waste contamination reduction.	

Table 2.1: Public Education and Outreach Activities (continued)

SWMP Strategy	Reporting Metric	2022-23 Activities	Adaptive Mgmt.
2.1.5 Parks & Pet Waste (Pet Waste, Rangers, Stewardship)			
	Description of annual education and outreach accomplishments regarding pet waste and other environmental activities	Portland Parks & Recreation (PP&R) Park Rangers perform education and outreach activities related to pets and pet waste in parks as part of general duties. Rangers regularly set up Leave No Trace booths at parks with high-volumes of complaint calls related to pets in parks, as well as at community events, fairs, and festivals. Leave No Trace provides an easily understood framework of minimum impact practices for anyone visiting the outdoors, including picking up pet waste. In FY 2022-23, with increased staffing, Park Rangers made 4,652 contacts–about 12 per day–related to pets, pet waste, and off-leash animals. In these contacts, Rangers provided education and issued warnings or citations as needed. Finally, the Land Stewardship division installs and maintains pet waste signage throughout parks and natural areas to remind visitors about the importance of scooping up waste.	
2.1.6 Pollution Prevention Outreach			
	Description of annual Pollution Prevention Outreach accomplishments	The City participated in the Eco-Logical Business (EcoBiz) Certification Program, which provides free technical assistance, tools, and training resources to Oregon's automotive and landscaping businesses. The program encourages responsible stormwater and wastewater management and pollution prevention practices. During the reporting period: • 335 business received EcoBiz outreach • 37 spill kits were distributed, with an estimated 111 employees trained on spill control and prevention • 30 businesses received pollution prevention resources • 8 business received technical assistance • 1 new business completed all steps for certification, and 5 businesses completed all steps for recertification • 7 businesses started the certification process, which is ongoing The City's participation in this program is being curtailed beginning in FY 2023-24 as described in the Adaptive Management section of this report.	✓

Table 2.1: Public Education and Outreach Activities (continued)

SWMP Strategy	Reporting Metric	2022-23 Activities	Adaptive Mgmt.
2.1.7 Alternative Transportation			
	Description of annual accomplishments related to alternative transportation	The City performed a number of activities during the reporting year related to alternative transportation: **Open Streets and Active Transportation** The open streets and active transportation engagement program engaged community members through bike rides, bike workshops, and events. The focus on bike rides and workshops was intentionally shifted to communities of color and people new to biking. There were 64,384 attendees over three Sunday Parkways events. **Partnerships** The City partnered with community organizations to offer Portlanders more transportation programming. The AARP led 7 walks with a total of 330 walkers, Oregon Walks hosted 31 walk-focused events with over 500 attendees, and OPAL hosted 2 workshops with a small but mighty YEJA cohort of 6 students. **Ride Every Wednesday Campaign** In Spring 2023, the Portland Bureau of Transportation (PBOT) activated the Rose Lanes in downtown Portland with a Ride Every Wednesday campaign. The effort was focused on accelerating a return to transit, supporting downtown recovery from the COVID pandemic, and motivating people to go to their downtown offices. **Transportation Wallet Access for All** Transportation Wallet is a program focused on offering a package of free transportation options, such as transit fare, bike or scooter-share rides, and ride-shares (Uber/Lyft) or taxi rides for people and households living on low incomes. The program is focused on reducing barriers to using transportation options such as cost, technology access, credit/debit card requirements, and low-income verification processes for different providers. PBOT staff worked to solidify permanent funding and expansion plans for the program. A 20-cent equitable mobility fee added to parking transactions in metered districts provide revenue to the program. Transportation Wallet: Access for All also secured funding through the Portland Clean Energy Fund (PCEF) as it supports decarbonization efforts in the City. These investments allow program staff to begin implementing a permanent program. As of Summer 2023, 18 community partners were identified for the next round of Transportation Wallets. Program staff are building the digital infrastructure for the program.	
2.1.8 City Leadership and Elected Officials			
	Description of annual accomplishments for outreach to City leadership and elected officials	BES conducted outreach to City leadership and elected officials during the reporting period primarily around development of the new MS4 SWMP Document. The following list highlights some outreach activities: • Communicated with Commissioner Mapps, policy advisor on the SWMP and facilitated the public comment period. • Presented the SWMP to the City's Planning and Development Directors and lead staff for key bureaus impacted by the MS4 permit, including BES, Portland Water Bureau, PBOT, Portland Fire and Rescue (PF&R), Prosper Portland, Portland Housing Bureau, Bureau of Development Services, BPS, and PP&R. • Presented Title 10 Erosion Control Code Changes before Portland City Council. • Presented a draft of the updated SWMP Document to the Portland Utility Board. PUB responded with extensive comments on September 29 that were incorporated as appropriate into the final SWMP Document. • Conducted a commissioner briefing on the City/Port Intergovernmental Agreement for joint management of the MS4 permit.	

Table 2.2: Public Involvement and Participation Activities

SWMP Strategy	Reporting Metric	2022-23 Activities	Adaptive Mgmt.
2.2.1 Public Website			
	Maintain public MS4 website	BES developed a new MS4 website and continued to maintain associated program websites.	
2.2.2 Watershed Education and Stewardship			
	Involve approximately 10,000 participants and volunteers in community events, workshops, stewardship projects, and restoration events annually	BES stewardship activities involved 8,782 participants and volunteers during the reporting period. **Accomplishments** BES offered a wide variety of ways for Portlanders to participate, including paddling events, natural planting projects for students in natural areas and developed parks, trash clean-up and education for unhoused community members, and restoration events using Indigenous Traditional Ecological and Cultural Knowledge. **Challenges** Stated metric was not met due to a City contracting office problem for one service provider and a staffing problem for another service provider. Each of these issues cut expected participation in half (approximately 800 participants).	✓
2.2.3 Grants Programs			
	Community Watershed Stewardship Program Grants Award at least $100,000 in grants annually (cumulative)	The Community Watershed Stewardship Program awarded $96,839 total in grants. Community Watershed Stewardship Grant highlights included a first-time award to a group working in a prison, two grants for a program working with unhoused community members, and a grant for several school groups to learn outside.	✓
	Neighborhood to the River Grants Award at least $100,000 in grants annually (cumulative)	The Neighborhood to the River program awarded $64,593 in grants.	✓
	Percent for Green Grants Award at least $100,000 in grants annually (cumulative)	The Percent for Green Grant program awarded $1,263,328 total for two large projects this year. One program highlight is a collaboration between BES, PBOT, PP&R Urban Forestry, and residents in southeast Portland for a "Trees in the Curb Zone" pilot project to develop a framework for increasing tree canopy. The pilot, an early implementation project of the recently adopted Pedestrian Design Guide, de-paves portions of the street and plants trees in the parking zone where there is not enough room for trees behind the curb. In addition to stormwater management, the trees help reduce the urban heat island effect and calm traffic.	
	Portland Harbor Community Grants Award at least $100,000 in grants annually (cumulative)	The Portland Harbor grant program awarded a total of $481,837 in community grants during the reporting period.	

Table 2.2: Public Involvement and Participation Activities (continued)

SWMP Strategy	Reporting Metric	2022-23 Activities	Adaptive Mgmt.
2.2.4 Community Engagement Initiative			
	Complete the evaluation of initial project phase results and include a summary in the 3rd year MS4 Annual Report (due November 1, 2023)	The initial phase of the BES Community Engagement Initiative was completed in Fall 2022. It involved two consultants conducting small focus groups and one-on-one conversations with community members. This was focused engagement, with recruitment of participants who had experiences with BES, such as a basement sewer back-up or enrollment in a financial assistance program, as well as participants from communities that are not typically heard from. Focus groups and conversations centered on three issue areas: healthy neighborhoods, affordability, and fairness. In brief, general findings included the following: • Trees and green space are important • Clean water is important • There is low understanding of how sewer/stormwater/water funding is used • There is interest in varying what customers pay by income • Awareness of and access to government programs differs	

Table 2.3: Illicit Discharge Detection and Elimination (IDDE) Activities

SWMP Strategy	Reporting Metric	2022-23 Activities	Adaptive Mgmt.
2.3.1 MS4 Map			
	Maintain an MS4 map and digital inventory	The City continues to maintain and update a current MS4 digital inventory and map of MS4 assets. This is performed on a daily, ongoing basis. The map can be accessed via the BES MS4 website and via PortlandMaps.com	
2.3.2 Ordinance			
	Description of annual activities related to IDDE ordinances (Portland City Code [PCC] Chapter 17.39 and 17.32)	In FY 2022-23, BES began an initial review of PCC Chapter 17.39 to identify policy updates for a future code revision.	
2.3.3 Program to Detect & Eliminate Illicit Discharges			
	Number of pollution complaints and inquiries received via the City's spill reporting hotline annually	The City's spill reporting hotline received 1,972 pollution complaints and/or inquiries during FY 2022-23. Out of this number, 673 warranted and resulted in further investigation, and 556 were related to a spill or a discharge.	
2.3.4 Dry-Weather Screening Program			
	Perform dry-weather screening inspections at 25% or more of all major and priority outfall locations annually	Dry-weather screening activities were conducted during the reporting period: • 130 major outfall locations were inspected (100%) • 2 priority outfall locations were inspected (100%) No illicit discharges were identified during the FY 2022-23 dry-weather screening period. There was one potential illicit discharge observed at Outfall M3, prompting sampling for laboratory analysis, which found elevated *E.coli* and mercury. Further investigation did not identify a source, and follow-up sampling showed a significant reduction in both pollutants. The elevated results were attributed to the tidal influx of river water and sediments from Swan Island Lagoon to Outfall M3 that occurs twice daily.	
	Update dry-weather priority locations and strategy by November 2023	During the reporting period, staff began updating the City's criteria for selecting dry-weather screening priority locations. The updated selection process uses a combination of risk factors to determine priority locations for dry-weather screening. Risk factors include specific characteristics of City outfall basins, such as land use, impervious area, landscape features, and past dry-weather screening inspection information. The updated selection criteria will be used to identify future priority locations. New locations will be added to the MS4 web map. Implementation of dry-weather screening at the updated locations is expected to begin in the summer of 2024.	✓

Table 2.3: Illicit Discharge Detection and Elimination (IDDE) Activities (continued)

SWMP Strategy	Reporting Metric	2022-23 Activities	Adaptive Mgmt.
2.3.5 Enforcement			
	Number of enforcement actions issued under PCC Chapter 17.39 annually	A total of 52 enforcement actions were issued under the City's illicit discharge ordinance (PCC Chapter 17.39). The types of enforcement actions issued during FY 2022-23 included the following: • 42 Notices of Violation • 8 Notices of Assessment of Cost • 1 Warning Notice • 1 Compliance Order The total count includes cases that are still open due to a request for an administrative review.	
	Number of associated penalties and costs assessed annually	The following are penalties/costs associated with violations of PCC Chapter 17.39 in FY 2022-23 (all Notices of Violation and Notices of Assessment of Cost have penalties/costs.) • Notices of Violation: Total $43,900 (associated with 42 enforcement actions) • Notices of Assessment of Cost: Total $35,322.91 (associated with 8 enforcement actions) These total penalty amounts do not include cases where the responsible party requested an administrative review and the case is still pending.	
2.3.6 Data Tracking			
	Tracking and assessment	The City continues to track implementation of IDDE activities via various databases (pollution complaint, enforcement, etc.) and geographic information systems. Data tracking and assessment is performed on a daily, ongoing basis.	
2.3.7 Staff Training and Education			
	Description of staff training activities	The dry-weather screening program lead conducted a review of the outfall basin investigation procedures with two investigative field staff. Topics included: • Field screening procedures • Accuracy of documenting parameters on the iPad • How to respond to exceedances • Hardness reagent updates • Proper nomenclature for samples on the chain of custody form. • Changes to the list of outfalls • Areas with the potential for special basin investigations • Storage of field equipment in the field lab • Calibrating the dissolved oxygen meter • Notifications to sample receiving from the field Staff were also provided copies of the following documents: • Field screening guidance • Colorimeter test procedures • Outfall Basin Investigation (OBI) inspection form (hard copy) • Dissolved oxygen meter check log • Combo meter check log • Sample chain of custody form • Combo meter calibration instructions	

Table 2.3: Illicit Discharge Detection and Elimination (IDDE) Activities (continued)

SWMP Strategy	Reporting Metric	2022-23 Activities	Adaptive Mgmt.
2.3.8 Services Related to Homelessness			
	Provide annual summary, outlining challenges, accomplishes, and partnerships	The City coordinated to provide sewage pump-out services for individuals living in recreational vehicles (RVs) in rights-of-way (ROWs). The City developed new promotional materials, including a refrigerator magnet with the pump-out service number and a door hanger. The City continued to promote the program through PP&R Park Rangers and the BES Spill Response Duty Officers. RV dwellers continue to let others know about the program. BES and associated contractors performed 1,139 sewage pump outs of RVs during the reporting period and collected 17,214 pounds of trash. The City also opened a Safe Rest Village (SRV) for RV dwellers at the end of the reporting year. BES and its contractor are coordinating to provide pump-outs at the SRV and will report on that activity next year.	✓
	Description of activities related to camp removal and cleanups, garbage removal, and portable sanitation station deployment	During the reporting period, the City's Impact Reduction Program conducted the following activities through associated contractors: • Cleaned up over 13 million pounds of garbage. • Removed 4,700 campsites. • Completed 30,000 risk assessments. • Bathroom access (via portable sanitation stations) was reduced from 120 to 10 due to shifts in City administrator priorities. The cost per bathroom station, including leasing, graffiti removal, and servicing units, is about $300–$500/month. Costs can vary widely based on the maintenance needs at a particular location. If a unit is vandalized, the cost can be substantially higher. • Expanded the partnership with Groundscore Association through the City's GLITTER program to provide waste collection and recycling diversion tent-side. The City continues to coordinate through the Street Services Coordination Center to identify and respond to high-impact campsites.	

Table 2.4: Erosion Control for Construction Site Runoff Activities

SWMP Strategy	Reporting Metric	2022-23 Activities	Adaptive Mgmt.
2.4.1 Ordinance			
	Description of annual activities related to Erosion Control Ordinance (PCC Title 10)	On October 21, 2022, Portland City Council adopted changes to PCC Title 10, Erosion and Sediment Control Regulations, after years of intense work by City staff and experts to bring City erosion control policies up to current and best standards. The updates moved many of the provisions related to specific requirements and standards from Title 10 to the ESCM or the Erosion and Sediment Control Enforcement Administrative Rule. These changes help provide clarity, consistency, and ease of administration. The Enforcement Fee and Penalty Schedule add escalating enforcement fees and fines for noncompliance with PCC Title 10 and the ESCM.	
2.4.2 Erosion Control Plan Requirements & Plan Review			
	Number of construction/development permits issued annually	BDS issued approximately 2,675 development permits during the reporting period that required erosion and sediment control plan review and inspection.	
	Description of annual erosion control plan review activities	As noted above, the City's ESCM was updated and released in October 2022. The update made the manual easier to use and implement. It includes a new Simple Site Erosion Control Plan form that replaces the previous Simple Site Erosion Control form, sample plans to guide users in the development of graphical erosion and sediment control plans, and an updated plan review checklist for commercial and residential sites. BDS Site Development staff continue to review permit applications with ground-disturbing activities to determine if erosion control plan review and inspection are required. The new Simple Site Erosion Control Plan is now required instead of the Simple Site Erosion Control form. For sites that qualify as Special Sites, a graphical plan is required. BDS plan reviewers generally will not approve plans or permits for construction sites with 1 acre or more of ground-disturbing activities until DEQ issues a 1200-C permit, unless the applicant demonstrates that DEQ does not require the 1200-C permit.	
2.4.3 Construction Site Inspections			
	Number of erosion control inspections performed annually	BDS conducted 4,230 erosion control inspections during the reporting period.	
2.4.4 Enforcement			
	Number of enforcement actions issued annually	BDS issued 667 enforcement actions under PCC Title 10 during the reporting period.	
2.4.5 Data Tracking			
	Tracking and assessment	The City continues to track implementation of the Construction Site Runoff program activities using a robust development permitting database system. This is performed on a daily, ongoing basis.	

Table 2.4: Erosion Control for Construction Site Runoff Activities (continued)

SWMP Strategy	Reporting Metric	2022-23 Activities	Adaptive Mgmt.
2.4.6 Erosion Control Education & Outreach			
	Description of erosion control education and outreach activities conducted annually	The City conducted extensive outreach and public comment activities as part of new PCC Title 10 amendments, the ESCM update, and the Enforcement Administrative Rule.	
2.4.7 Erosion Control Staff Training and Education			
	Description of staff training activities	In FY 2022-23, BDS inspection staff completed continuing education credits for individual inspection certifications as well as attended an all-day clean water exposition as a team.	

Table 2.5: Post-Construction Site Runoff for New and Re-Development Activities

SWMP Strategy	Reporting Metric	2022-23 Activities	Adaptive Mgmt.
2.5.1 Stormwater Management Manual (SWMM)			
	Finalize a SWMM update by November 1, 2024. Maintain and update the SWMM to align with performance standard requirements in the MS4 permit	Progress is underway and on schedule for SWMM revisions targeted for 2024. The primary change is the incorporation of the Numeric Stormwater Retention Requirement (NSRR) retention requirement in the 2021 MS4 permit.	
	Conduct a technical evaluation of the current SWMM threshold related to new MS4 performance standards by June 30, 2024	During the reporting period, BES initiated an update of a 2020 analysis on the potential outcomes and impacts of changing the SWMM threshold. The effort included extracting development permitting data for project sites between 500 and 1,000 square feet. The 2020 effort revealed that changing the threshold would result in a minimal change to the amount of impervious area being managed via the SWMM, but a substantive "savings" in the form of reduced permit load. Analysis of more recent data has not yet been completed, but the goal is to understand the impact of recent zoning changes on development patterns. The most significant zoning changes will likely be the elimination of parking requirements for residential developments and the re-zoning of single-dwelling zones to allow middle housing in the form of up to a fourplex on most residential lots. This evaluation is critical in the current political climate and the city- and state-wide housing emergency.	
2.5.2 Ordinance			
	Description of annual activities related to post-construction ordinance (PCC Chapter 17.38)	No activities to amend PCC Chapter 17.38 were conducted during FY 2022-23. SWMM changes in 2024 could precipitate in related changes to this code, such as a change to the square-footage threshold.	
2.5.3 Post-Construction Runoff Site Plan Review			
	Annual number of SWMM-related permits/projects with constructed stormwater management facilities (SMFs) issued	53 development projects with constructed SMFs were implemented in the MS4 area during the reporting period (city-wide: 457 projects; MS4 area: 53 projects).	
	Annual amount of impervious area acreage managed by SMFs	18 acres of impervious area were managed by SMFs constructed in the MS4 area during the reporting period (city-wide: 112 acres; MS4 area: 18 acres). This includes stormwater retrofits on redeveloped properties subject to the SWMM.	
	Significant accomplishments or challenges during the reporting period related to SWMM plan review activities	The City continued to perform SWMM plan review activities during the reporting period. There were no significant issues to report.	
	Annual number of land use reviews conducted	320 environmental land use reviews were conducted during the reporting period.	
	Description of annual land use plan review activities	Staff attrition and management changes were challenges for land use plan review functions during this reporting period.	

Table 2.5: Post-Construction Site Runoff for New and Re-Development Activities (continued)

SWMP Strategy	Reporting Metric	2022-23 Activities	Adaptive Mgmt.
2.5.4 Stormwater Management Facility Installation Inspections			
	Stormwater management facility installation inspections	City staff continued to conduct onsite inspections during the construction phase of development projects subject to the SWMM to assess and ensure proper installation of the approved site design and stormwater controls.	
2.5.5 Water Quality Benefit Offset Programs (Special Circumstances)			
	Description of annual activities related to the Water Quality Benefit Offset Programs (Special Circumstances)	SWMM Special Circumstances requests continued to be evaluated by the City's Special Circumstances Committee, which meets every 2 weeks to discuss and approve or deny cases. BES added a new process in the 2020 SWMM for projects to pay for Special Circumstances. This process is called the Staff Review Special Circumstances. Specific project categories are automatically eligible to pay the offsite fee in situations where BES has predetermined that building a facility for these projects is infeasible or hazardous. This process has been valuable during the development review process by clarifying policies around specific project categories, which avoids unnecessary engineering costs to justify infeasibility on a project-specific basis. During the reporting period, 17 committee review cases and 17 staff review cases were approved. Monies collected as part of the offset program fund the Percent for Green grant program. Grants awarded during this reporting year funded two projects: PBOT Trees in the Curb Zone and PP&R Washington Park South Entry Stormwater.	
2.5.6 Post-Construction Program Outreach			
	Description of SWMM-related education and outreach activities conducted annually	No SWMM outreach activities were conducted during this reporting year.	
2.5.7 Post-Construction Staff Training & Education			
	SWMM Administration Description of staff training activities	SWMM staff engaged with the Green Infrastructure Leadership Exchange and met with peer jurisdictions on a regular basis to discuss stormwater management facility performance and design, along with climate resiliency.	
	SWMM Development Plan Review Description of staff training activities	No specific training activities for the Development Plan Review team occurred during the reporting period. There were no newly hired or appointed employees assigned to SWMM review or inspection positions that required training. All SWMM duties were performed by existing/trained employees.	
	Land Use Plan Review Description of staff training activities	No specific staff training activities were conducted during the reporting period.	

Table 2.5: Post-Construction Site Runoff for New and Re-Development Activities (continued)

SWMP Strategy	Reporting Metric	2022-23 Activities	Adaptive Mgmt.
2.5.8 Data Tracking			
	Tracking and assessment	The City continues to track implementation of the Post-Construction Site Runoff program activities via a robust development permitting database system. This is performed on a daily, ongoing basis.	

Table 2.6: Post-Construction Long-Term Operation and Maintenance Activities

SWMP Strategy	Reporting Metric	2022-23 Activities	Adaptive Mgmt.
2.6.1 Ordinance			
	See Table 2.5 for details.		
2.6.2 Maintenance Inspection Strategy			
	Number of new SWMM Operations and Maintenance (O&M) Agreements	183 new SWMM O&M Agreements for stormwater management facilities were recorded during the reporting period.	
	Number of SMFs covered by new O&M Agreements	The O&M Agreements cover 304 new stormwater management facilities installed during the reporting period.	
	Inspect 1,500 private stormwater facilities annually	2,418 stormwater management facilities were inspected by the Maintenance Inspection Program (MIP).	
2.6.3 Enforcement			
	Number of corrective actions required and/or enforcement actions issued	The MIP issued a total of 334 enforcement actions during the reporting period, including: • 325 Corrective Actions • 4 Notices of Violation • 4 Warning Notices • 1 Voluntary Compliance Agreement	
2.6.4 Data Tracking			
	Tracking and assessment	The City continues to track implementation of the Long-Term O&M program activities via a robust asset management database system. This is performed on a daily, ongoing basis.	
2.6.5 Long-Term O&M Outreach and Assistance			
	Description of MIP-related education and outreach activities conducted annually	The following outreach activities were conducted during the reporting period: • 1,733 maintenance reminders were mailed to all single-family residential homeowners with vegetated SMFs. This is generally done on an annual basis. • MIP maintains a webpage with program information and links to standard O&M Agreement requirements, tools, and resources. • Whenever possible, MIP staff ensure a property representative is onsite during the inspection and provide education regarding SMF O&M. It is standard practice for the MIP to include outreach materials and information with the follow-up inspection reports, including but not limited to the site-specific O&M plan, SMF location map, and a link to the program webpage.	

Table 2.6: Post-Construction Long-Term Operation and Maintenance Activities (continued)

SWMP Strategy	Reporting Metric	2022-23 Activities	Adaptive Mgmt.
2.6.6 Long-Term O&M Staff Training and Education			
	Description of staff training activities	The MIP implemented new asset management software during the reporting year to track SMFs and associated O&M activities. Most staff training focused on use of the new database to include data entry of SMF O&M details, inspection planning and scheduling, and inspection documentation. The MIP also updated relevant city code violation descriptions and enforcement responses related to SMF modification. Staff were trained on the code modifications. In addition, an annual all-staff field inspection has been implemented to promote cross-training and inspection consistency across all inspectors.	

Table 2.7: Pollution Prevention and Good Housekeeping Activities for Municipal Operations

SWMP Strategy	Reporting Metric	2022-23 Activities	Adaptive Mgmt.
2.7.1 MS4 Inspection, Maintenance, and Cleaning			
	Initiate update of the current O&M guidance by June 30, 2024, and report progress thereafter	No activity to report during this period.	
	Provide or reference in the SWMP Document an alternate risk-based inspection and maintenance schedule for inlets in accordance with permit Schedule A.3.f.ii. by November 1, 2025	The following efforts were made during the reporting period: 1. Identified which inlets are part of the MS4 system (versus combined or underground injection control [UIC] areas) via GIS analysis. Initial results indicate roughly 13,000 of 56,000 inlets in the City are part of the MS4 system. 2. Developed and field-tested a new inlet inspection process, specifically to support the goal of inspecting all MS4 inlets during the 5-year permit period.	
	Number of inspections, cleanings, and/or repairs by asset type	The following maintenance activities were conducted during the reporting period: • Storm Inlets: 12,386 inspections/cleanings (56,046 total assets) • Storm culverts and pipes: 6.4 miles inspected, 5.0 miles cleaned (446 total miles) • Trash racks: 3,057 inspections and cleanings (326 assets) • Stormwater conveyance ditches: 51.4 miles inspected and 11.9 miles cleaned 54.1% (95 total miles) • Green streets: 2,662 inspections and 8,808 cleanings (2,516 green street assets) • Water quality facilities (other than green streets): 530 inspections, 83 cleanings (436 assets) Note: The asset inventory and reported numbers have not yet been delineated by MS4, UIC, or combined sewer area.	
2.7.2 SW O&M Staff Training and Education			
	BES Stormwater Maintenance Engineering Description of staff training activities	No specific training activities to report during the period. Field crews were focused on safety-related training and community hazards.	

Table 2.7: Pollution Prevention and Good Housekeeping Activities for Municipal Operations (continued)

SWMP Strategy	Reporting Metric	2022-23 Activities	Adaptive Mgmt.
	BES Green Stormwater Infrastructure Description of staff training activities	• All new green stormwater infrastructure (GSI) O&M staff receive comprehensive onboarding and training in the months after hiring, with one senior GSI O&M staff person designated as trainer and at least one "onboarding buddy" to assist. One new GSI O&M specialist (a.k.a. a "site manager") started in January 2023 and was trained throughout the remainder of the year. Similarly, when contracted service vendors (contractors) hire a new employee, especially a new crew leader, GSI O&M staff provide initial training and ongoing oversight to ensure that their work conforms to expected standards and contract specifications. • GSI O&M also uses semi-monthly Lunch & Learn field sessions and occasional "summits" in the office for all staff to gather to review topics, share information, and discuss ideas for future improvement. Lunch & Learn topics during the reporting period included parcel-based new facility construction, condition assessment inspections, parcel-based water quality facility management, unique project (New Columbia) history, soil subsidence capital repair, and management and rehabilitation of problematic facilities. Summits included green street design and construction, facility rehabilitation and replanting, stormwater facility easements, and plant and tree species review. • GSI O&M staff have received technical training to support the transition from Hansen Mobile Solutions (HMS) to Infor Field Inspector (IFI), a new application for interfacing with Infor Public Sector from the field. This transition began near the end of the reporting period and staff will continue to receive training and support into FY 2023-24. • Multiple GSI O&M staff are active in the Green Infrastructure Leadership Exchange (giexchange.org), participating in monthly peer learning sessions for asset management, innovations in design, and maximizing GSI performance. • Most GSI O&M staff attend the annual Urban Ecology and Conservation Symposium (uercportland.org/symposia) hosted by the Urban Ecological Research Consortium at Portland State University. • Several GSI O&M staff hold an Oregon Department of Agriculture (ODA) public pesticide applicator license and must attend trainings to earn recertification credits. Multiple GSI O&M staff attend the annual Four-County Cooperative Weed Management Area's "Pull-Together" event, an opportunity for ODA recertification credits or learning about emerging issues and species of concern for invasive plant management in the Portland metro region. • All GSI O&M staff must stay current with training for work-zone traffic control to ensure safe implementation of maintenance activities in the ROW. Roadway worker protection trainings are hosted as needed, such as for new hires or expiring certifications. • GSI O&M received training in effective communication and de-escalation to foster safer interactions with members of the community, including those that may be struggling with houselessness, mental health issues, or drug abuse.	
	PBOT Maintenance Operations Description of staff training activities	PBOT Maintenance Operations staff who conduct stormwater O&M activities received training on general and specific safety procedures related to their work. They also received specific training on chemical safety and hazard communications (GHS). They also received training on proper ditching techniques to maintain the stormwater conveyance system in the ROW. These trainings are conducted annually.	

Table 2.7: Pollution Prevention and Good Housekeeping Activities for Municipal Operations (continued)

SWMP Strategy	Reporting Metric	2022-23 Activities	Adaptive Mgmt.
2.7.3 Roadways & Transportation			
	Street sweeping frequency by major roadway type	Sweeping of arterial roadways was completed five to six times during the reporting period. Residential roadway sweeping was completed one to two times during the reporting period.	
	Amount of material removed from City roadways (tons or CY)	14,053 cubic yards of material was removed from roadway street sweeping; 4,459 cubic yards of material was removed from cleaning of storm inlets and catch basins.	
	Initiate review of the PBOT Maintenance Environmental Handbook by June 30, 2024, and report progress thereafter	No activities were undertaken during this reporting period.	
2.7.4 Winter O&M Strategy			
	Deicing and anti-icing materials used annually	During the reporting period, 161,369 gallons of magnesium chloride anti-icing liquid was placed on roadways during the winter season (November–April), and 858 cubic yards of salt was placed on roadways during snow events.	
	Number of winter weather events where deicing and/or anti-icing material was used annually	During the reporting period, magnesium chloride was placed on roadways during 51 shifts (8-hour work period) during the winter season (November–April). Salt was deployed during three snow and ice events.	
	Quantities and general location(s) of materials used (e.g., estimates of salt used based on route distance annually)	Salt and anti-icing material is placed on only preapproved routes by PBOT during the winter period as needed. These routes have considered potential impacts to waterbodies. Magnesium chloride is applied at a rate of 30 gallons per lane mile to prevent bonding of ice onto the roadway. Salt is applied at a rate of 200 tons per lane mile to break up ice and allow it to be plowed.	
2.7.5 Roadways & Winter O&M Staff Training & Education			
	Description of staff training activities	Winter operations field staff attend training annually in October to refresh their knowledge of snow management techniques. Best Management Practices, equipment use, and safety are discussed during this training.	
2.7.6 Integrated Pest Management: Pesticide & Fertilizer Use			
	Description of annual activities related to the Integrated Pest Management (IPM) Program	No major changes or challenges to the City's IPM Program occurred during the reporting period. The Pesticide Review Committee approved a few new pesticides: one product is emamectin benzoate, an insecticide that helps control the invasive emerald ash borer; the other product is sureguard, a preemergent herbicide.	
2.7.7 IPM Staff Training & Education			
	Description of staff training activities	Pesticide applicators were able to attend recertification training held in the spring and fall. They can also attend outside training that is relevant to their field of work.	

Table 2.7: Pollution Prevention and Good Housekeeping Activities for Municipal Operations (continued)

SWMP Strategy	Reporting Metric	2022-23 Activities	Adaptive Mgmt.
2.7.8 Sewage Release Prevention			
	Description of relevant sewage release prevention activities	Portland's capacity, management, operations, and maintenance (CMOM) program ensures that components of the collection system are cleaned and inspected at the right frequency. The program also ensures that preventive maintenance and repairs are performed to cost-effectively reduce the number of sewer releases, extend the useful life of the City's sewer infrastructure, and properly manage collection system operations. CMOM program accomplishments in FY 2022-23 include: • Inspection of 0.61 million feet (116 miles) of sewer pipe, or about 6.0% of the mainline sewer system • Cleaning of 1.15 million feet (217 miles) of sewer pipe, or about 11.3% of the mainline sewer system • Mainline sewer maintenance repairs on 8,147 feet of pipe; 51% of the repairs were in response to collection system problems • Repair of 416 service laterals totaling about 5,210 feet of pipe; 63% of those repairs were in response to discovered problems • Treatment of nearly 313,391 feet (59 miles) of sewer pipe for roots using chemical root foaming • Completion of 18 inspections of maintenance holes considered to be at greatest risk of failure (Tier 2, see Note 1 below). • Completion of six capital improvement program (CIP) projects repairing and rehabilitating portions of the sanitary and combined collection system during the 2022 calendar year, resulting in an estimated risk reduction of $76.4 million. Maintenance activity on mainlines and service laterals also resulted in an estimated risk reduction of $2.4 million (see Note 2 below). 1. *See FY23 CSO and CMOM Annual Report, Section 3.1.5.* 2. *Risk reduction values in this bullet are reported on a calendar year basis due to reporting lag times.*	
2.7.9 Firefighting Training Activities			
	Description of pertinent activities related to firefighting training facilities	During the reporting period, BES Industrial Stormwater and Pretreatment Programs conducted an inspection of PF&R's training facility and conducted dye-testing of drains and valves in the outdoor training areas. BES has required several site retrofits, including isolation of the extraction and live training areas with permanent plumbing to the sanitary sewer system, and rehab of an onsite stormwater swale.	
Other			
		On 1/3/2023, a DEQ staff person witnessed a Portland Water Bureau (PWB) crew installing a water meter cover using concrete and allowing the concrete wash water to enter an inlet. The impacted inlet is not part of the City's MS4, but discharges to the combined sewer system. Regardless, BMPs were not being properly implemented. The incident highlighted a need for improved training of PWB staff on illicit discharges and appropriate use of BMPs. In response, the City's environmental compliance staff has conducted training and increased coordination with PWB staff. A *Water Bureau Maintenance and Construction Erosion Control Best Management Practices (4/17/2023)* training sheet was developed to reduce the discharge of suspended solids and hydraulic loading and complete de-chlorination for planned and emergency repair work.	

Table 2.8: Industrial and Commercial Facility Activities

SWMP Strategy	Reporting Metric	2022-23 Activities	Adaptive Mgmt.
2.8.1 Industrial Stormwater Program			
	Number of 1200-Z/A permits administered	The BES Industrial Stormwater Program (ISW) administered 236 1200-Z/A NPDES Industrial Stormwater Discharge Permits under an IGA with DEQ during the reporting period. ISW copies DEQ on all notifications to facilities that are required to obtain permit coverage.	
	Number of 1200-Z/A site inspections	Conducted 232 site inspections of 1200 Z and 1200 A permitted facilities.	
	Inspect all 1200-Z/A permitted facilities and review associated monitoring results once per year	Inspected all facilities except for those with permits terminated prior to the end of the reporting year and one new permit issued on 6/15/2023.	
	Number of 1200-Z/A violations with enforcement actions	263 violations of the 1200-Z/A permits were identified resulting in enforcement actions.	
	Number of nonpermitted site inspections	119 inspections of nonpermitted sites were conducted.	
	Conduct 30 inspections of nonpermitted sites per year	Milestone of 30 inspections of nonpermitted sites was exceeded during the reporting period.	
	Number of No Exposure Certifications (NECs) issued/reissued	26 NECs were issued or reissued.	
	Inspect NEC sites upon or prior to the 5-year NEC expiration date	Met the target to inspect NEC sites upon the expiration date.	
	Number of new City-required Source Control Plans approved	13 new Source Control Plans were approved.	
2.8.2 Industrial Stormwater Staff Training & Education			
	Description of staff training activities	The following training activities took place for Industrial Stormwater Program staff: • Discharge Monitoring Report compliance review refresher to ensure a comprehensive and consistent approach. • Training on the updated, July 2022, DEQ Water Quality Stormwater Violation Guidance and associated BES enforcement matrix. • A Spill Response standard operating procedure manual developed by ISW and staff training on the contents. • Tier 2 Corrective Action Report review refresher, including changes to Tier 2 design storm based on the 2020 City SWMM. • Training on the U.S. Environmental Protection Agency (EPA)-approved 2022 DEQ Integrated Report in association with 1200-Z implementation. • Staff shadowing of EPA 1200-Z inspections in Portland this year. An EPA inspection debrief was held with all staff to share the lessons learned.	

Table 2.8: Industrial and Commercial Facility Activities (continued)

SWMP Strategy	Reporting Metric	2022-23 Activities	Adaptive Mgmt.
2.8.3 Source Control Manual			
	Description of annual activities related to the Source Control Manual	The City continued to implement the Source Control Manual during the reporting period, reviewing 1,223 projects that triggered pollution source controls. There was no activity during the period to update the manual.	
2.8.4 Commercial and Industrial BMP Outreach			
	Description of Groundwater Protection Program education and outreach activities conducted annually	The following outreach activities were conducted during the reporting period: • Provided technical assistance to 67 businesses within the Columbia South Shore Wellhead Field. • Held 2 groundwater protection compliance workshops that included pollution prevention and spill control content. • Distributed 6 free spill kits and 8 free spill response signs (at a minimum; not all sign distribution is recorded). • Produced Spanish and Russian translations of spill response signs.	

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3 Adaptive Management

Adaptive management is a structured, iterative process designed to refine and improve stormwater programs over time by evaluating results and adjusting actions based on what has been learned.[2] Simply stated, it is *learning by doing*. It identifies when program strategies, activities, BMPs, and the like should be examined more deeply and adjusted where needed.

The MS4 Permit states that "co-permittees must continue to implement, adaptively manage, and enforce the Stormwater Management Program (SWMP) designed to reduce pollutants from the MS4 to the Maximum Extent Practicable (MEP), to protect water quality and to satisfy the appropriate water quality requirements of the Clean Water Act."[3] The U.S. EPA intentionally did not provide a precise definition of MEP for MS4 permitting to allow maximum flexibility on a location-by-location basis. Among the factors to be considered in an MEP evaluation include "specific local concerns,…MS4 size, climate, implementation schedules, current ability to finance the program,…and capacity to perform operation and maintenance."[4]

The City's formal adaptive management approach includes two key elements:

(1) An **annual process** to ensure that the City's stormwater program is implemented in accordance with the SWMP Document, to evaluate progress toward meeting metrics and milestones, and to assess whether any programmatic adjustments or modifications to the SWMP Document are needed; and

(2) A **comprehensive process** submitted as part of the City's permit renewal application package that includes the modification, addition, and/or removal of BMP strategies and associated metrics and milestones in the SWMP Document.

The adaptive management process can result in updates to the stormwater management program or amendments to the SWMP Document as necessary.

As allowed in Schedule A.2.f of the MS4 Permit, the City may update actions and activities described in the DEQ-approved SWMP Document for adaptive management purposes. In accordance with the permit, the following sections provide the analysis, rationale, and discussion

[2] Schedule D.4.a, *Definitions*, 2021 MS4 NPDES Permit.
[3] Schedule A.1.a
[4] U.S. EPA. "National Pollutant Discharge Elimination System—Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges." Vol. 64 Fed. Reg. 68722 (December 8, 1999). https://www.govinfo.gov/content/pkg/FR-1999-12-08/pdf/99-29181.pdf.

for needed adjustments to the City's SWMP and specifics about modifications to the SWMP Document. The details discussed below relate to the annual process, as described, for both the reporting period (FY 2022-23) and the current period (FY 2023-24).

3.1 Evaluation

Portland is facing unprecedented challenges in the form of homelessness, public safety, and affordability. At the same time, the City owns and operates billions of dollars' worth of aging infrastructure that has become increasingly more difficult and costly to maintain and replace. These combined challenges present the need for substantial investments in the years ahead. In 2022, a local election prompted, in part, by these issues mandated a complete re-structuring of City government by January 1, 2025.[5]

The City's FY 2023-24 Adopted Budget forecasts concerning funding limitations, given the projected growth in expenses "due, in part, to inflationary costs, the sunsetting of federal one-time resources to fund ongoing needs, and the elevated level of deferred maintenance – all of which indicate that the demand for resources surpasses availability."[6] However, a reorganization of the City's government also presents significant opportunities for programmatic efficiencies, effectiveness, and innovation.

While BES oversees the City's MS4 Permit, multiple City bureaus implement the SWMP. Over the next 10 years, BES needs to significantly increase capital improvement program (CIP) expenditures to address aging infrastructure, regulatory requirements, public input, operational needs, and other priorities. Other bureaus have similar needs.

The City continues to meet or exceed MS4 Permit requirements. However, limited funding, combined with increased expenses and the need for massive investments, means that City and individual bureau budget reductions and re-allocations will occur at levels that may affect stormwater programs and necessitate ongoing modifications to the SWMP Document. The following is a synopsis of events and dynamics influencing the need for SWMP and SWMP Document modifications:

- Portland's slower-than-average economic recovery from the COVID-19 pandemic has resulted in reduced revenues.[7]

[5] City of Portland government transition overview: https://www.portland.gov/transition/overview.
[6] City of Portland FY 2023-24 Adopted Budget, Volume I, p. 17: https://www.portland.gov/cbo/2023-2024-budget/documents/fy-2023-24-adopted-budget-volume-1-citywide-summaries-and-bureau/download.
[7] Oregon Public Broadcasting (OPB). "Report on Portland economy shows slow rebound post-pandemic." February 23, 2023. https://www.opb.org/article/2023/02/21/portland-oregon-chamber-of-commerce-report-slow-economy-rebound-post-pandemic/.

- The City is spending significant money to address the local humanitarian crisis of homelessness, which increased by 65% from 2015 to 2023.[8] Mayor Wheeler directed bureaus to submit budgets and "offers" that directly contribute to this key priority.
- Economic factors such as inflation continue to affect City project and staffing costs and partnerships with external partners. For example, the nationwide shortage of public-school bus drivers impeded the ability to achieve Public Education and Outreach milestones. Portland Public School's bus driver shortages partly resulted in the inability to deliver the desired number of environmental education programs in FY 2022-23.
- The City is actively engaged in overhauling its governance structure, which involves re-allocating funding and resources from individual bureaus to support, in part, new positions.[9] However, re-structuring of City government and creation of a citywide "utility department" will likely present opportunities to achieve better environmental outcomes.
- Last May, the Portland City Council adopted a budget that included a freeze or reduction to planned increases to City utility bills and other fees.[10] In addition to affecting PBOT's budget, it contained two decision packages affecting the BES budget: reductions in the requested increases to sewer/stormwater rates and system development charges (SDCs). The reduction from 5.15% to 4.07% in requested sewer/stormwater rates resulted in a $4 million impact, and the SDC rate-reduction resulted in an additional $1 million impact to the BES budget *for the current fiscal year* (2023-24). [11] BES submitted necessary budget changes in the fall of 2023 to account for reduced revenue.
- BES has worked with DEQ over many years to identify and reduce sources of contamination conveyed to the Willamette River and Columbia Slough via stormwater outfalls. While the investigative work is largely complete, environmental remediation requirements continue to draw sizeable budget expenditures.

[8] City of Portland Mayor Ted Wheeler: Homelessness. https://www.portland.gov/wheeler/homelessness.
[9] City of Portland Budget Office. "2022 City Charter Reform Costing Process Overview. https://www.portland.gov/transition/documents/2022-city-charter-reform-cost-summary/download
[10] OPB. "Portland City Council passes $7.1 billion budget, despite debate over fee reductions, freezes." https://www.opb.org/article/2023/05/17/portland-oregon-city-council-passes-7-billion-dollar-budget-city-fees-debate/
[11] City of Portland FY 2023-24 Adopted Budget, Volume I, p. 322. https://www.portland.gov/cbo/2023-2024-budget/documents/fy-2023-24-adopted-budget-volume-1-citywide-summaries-and-bureau/download

- City staff responsible for implementing stormwater program measures have been encumbered by safety and security hazards. This has resulted in the need for increased resources and measures to protect employees in the course of their duties. External resources and partnerships are also being impacted by safety hazards. Increased funding for security services, for example, is needed to protect and preserve local natural areas. Safety concerns have resulted in reduced opportunities and places for field-based environmental education activities. City staff training has increasingly focused on safety and awareness topics.
- Contracting with external partners supports critical aspects of SWMP implementation. Due to administrative reductions and ongoing citywide changes, the contracting process is taking over a year in some cases, which adds to the growing burden on program and project implementation teams.
- PBOT, a key partner in the City's SWMP implementation, continues to be in a state of revenue crisis. The pandemic significantly impacted the bureau's revenues, resulting in losses of over 18% of expected resources over the past 3 years. To balance revenue losses, PBOT incurred a reduction of 10.5% since FY 2021-22, which included the loss of 43.5 staff positions.[12] PBOT also continues to incur significant costs related to the houselessness crisis. The current cost of removing derelict RVs from City rights-of-way is $3 million per year and requires re-allocation of staff duties, which further reduces revenue by an estimated $1.5 million per year.[13] Camp clean-up efforts on bureau-owned property also costs $1.3 million per year.[14] As a result of these and other resource challenges, typical PBOT activities related to the operation and maintenance of roadways is curtailed.

3.2 SWMP Modifications

Table 3 lists near-term modifications necessary to the SWMP Document based on an adaptive management evaluation of the reporting period (FY 2022-23) and information known to-date about the current period (FY 2023-24).

[12] *Id.* at 459.
[13] *Id.* at 460.
[14] *Id.*

Table 3.1: Adaptive Management

Primary	Reporting Metric	SWMP Document Modifications
2.1 Public Education & Outreach		
2.1.1 General Environmental Outreach		
	Number of Social Media "likes"	The BES Twitter (now X) account was discontinued due to the ongoing decline of the platform's user experience and diminishing ability to foster constructive and meaningful conversations. However, it is still used to disseminate urgent public advisory notifications. Facebook, YouTube and GovDelivery and other outreach actions continue to be leveraged to educate the public. Reference to the BES Twitter/ X account will be removed from the SWMP Document.
2.1.2 Clean Rivers Education Programs		
	Deliver 400 educational programs annually	POTENTIAL. Milestones may need to be revised downward due to external forces involving public schools, bus transportation, ongoing pandemic challenges for schools, and related circumstances that were unforeseen at the time of SWMP development.
2.1.6 Pollution Prevention Outreach		
	Description of annual P2O accomplishments	Beginning in FY 2023-24, EcoBiz program participation will be discontinued due to BES budget reductions described previously. The City will continue to conduct education and outreach activities to commercial and industrial facilities via other efforts, in accordance with Schedule A.3.a.iii of the permit. Section 2.1.6 of the SWMP Document will be modified accordingly.
2.2 Public Involvement & Participation		
2.2.2 Watershed Education and Stewardship		
	Involve approximately 10,000 participants and volunteers in community events, workshops, stewardship projects, and restoration events annually	POTENTIAL. Milestones may need to be revised downward due to severe contracting barriers and impediments experienced by external partners that were unforeseen at the time of SWMP development.
2.2.3 Grants Programs		
	Award at least $100,000 in grants annually (cumulative)	*Community Watershed Stewardship Program Grants* While issuing grants related to public engagement and stewardship is expected to continue, specific grant program names may be changed in the SWMP Document as budgetary and programmatic priorities shift within BES.
		Neighborhood to the River Grants Beginning in FY 2023-24, BES will be reducing the Neighborhood to the River program due to BES budget reductions for reasons described previously. References to this program in the SWMP will be removed.

Primary	Reporting Metric	SWMP Document Modifications
2.3 Illicit Discharge Detection & Elimination		
2.3.4 Dry-Weather Screening Program		
	Update dry-weather priority locations and strategy by November 2023	BES expects to implement updated risk-based priority locations for dry-weather screening in the summer of 2024 per Schedule A.3.c.v of the permit. The SWMP Document will be updated, as necessary, to reflect this shift.
2.3.8 Services Related to Homelessness		
	Provide annual summary, outlining challenges, accomplishes, and partnerships	POTENTIAL. The BES RV Pump Out program was established as a temporary activity that was scheduled to sunset in December 2024. However, BES will be looking into opportunities to extend and/or re-structure the program as the budget allows. The SWMP Document may be modified depending on future program status.

3.3 Forecast

The City is meeting or exceeding MS4 Permit requirements and expects to continue doing so. However, additional modifications to the SWMP and SWMP Document may be necessary in upcoming years as budget-related constraints continue and City government is re-structured. The following considerations inform potential future adaptive management changes:

- Portland's slow economic recovery, combined with the need for large investments in homelessness, affordable housing, and community safety.
- External market and labor forces are expected to continue impacting operational and capital project costs citywide.
- Resources that may be necessary to re-structure the City's government.
- Addressing aging infrastructure. An estimated $2.5 billion of BES's assets are in poor or very poor condition, which necessitates significant increases to capital project delivery throughput.[15] Meanwhile, market conditions and inflation have driven up costs at all stages of capital and operational projects and programs. Essentially, it costs more to deliver the same work. Therefore, the immediate CIP emphasis is on projects that address imminent threats or risk to human health, the environment, safety, and regulatory compliance. Projects with longer term risks and benefits have reduced urgency and will be postponed where possible.

[15] *Id.* at 329.

- BES priority expenditures include but are not limited to the following:
    - An increase of $72.2 million (31%) for the Secondary Treatment Expansion Program for the near-term phase of treatment clarifiers required by DEQ to be completed by the end of calendar year 2024.
    - Investments in environmental remediation efforts as required for Portland Harbor Superfund and Columbia Slough sediments.
    - A significant amount of work underway at the Columbia Boulevard Treatment Plant (CBWTP) to address operational, deferred maintenance, long-term capacity issues, and NPDES wastewater permit requirements.
    - Maintenance and upgrades to the City's two wastewater treatment plants and 98 pump stations located throughout the collection system. These urgent and complex projects will heavily influence resource allocation to or from other BES portfolios over the next 5 to 10 years, such as stormwater or restoration activities.
- PBOT's financial outlook has grown worse as critical revenue streams decline. The FY 2023-24 Adopted Budget includes a 4.3% reduction to bureau programs, including the loss of 16 positions, and calls for an additional 25% reduction in FY 2024-25 to balance its 5-year forecast.[16]
- City government re-organization, including likely creation of a utility department and a natural resources focus area that presents opportunities for program effectiveness and a re-alignment with community values.

Per *Schedule F, Section D.2* of the permit, "The co-permittees must give advance notice to the Department of any planned changes in the permitted facility or activities that may result in noncompliance with permit requirements." While ongoing adjustments to the SWMP are expected, the City will continue to meet or exceed MS4 Permit requirements.

[16] *Id.* at 459.

3.4 Summary

Challenges affecting the City's budget, revenue reductions, rising expenses, and needed investments indicate that modifications to our stormwater activities and SWMP Document are necessary now and moving forward to tackle Portland's urgent issues. At the same time, opportunities will likely arise with transition of the City's government and by prioritizing items noted above we'll address the most pressing needs for water quality and environmental health.

BES will initiate changes to the SWMP Document in fall of 2023 with anticipated completion in the winter of 2024. Changes as reported in Table 3 above will be made, but additional modifications may be identified after this report is submitted as new information becomes available and executive decisions are made.

The City's environmental professionals continue to innovate through major "change events" that Portland is facing. In accordance with the MEP standard, what is *practicable* for the City is ever shifting. In a time of both extraordinary challenge and opportunity, the City remains fully committed to ongoing compliance with the MS4 Permit.

APPENDICES

A Low Impact Development/Green Infrastructure Strategy

B Infrastructure Retrofit and Hydromodification Assessment Update

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Appendix A

Low Impact Development/ Green Infrastructure Strategy

November 1, 2023

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1 Introduction

Per Schedule A.3.e.iii of Portland's 2021 National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Phase 1 Individual Permit, the permittees are required to review and update or develop and implement "a strategy to require to the maximum extent feasible, the use of Low Impact Development and Green Infrastructure (LID/GI) design, planning, and engineering strategies intended to minimize effective impervious area or surfaces, and reduce the volume of stormwater discharge and the discharge of pollutants in stormwater runoff from development and redevelopment projects." After Oregon Department of Environmental Quality (DEQ) approval, this LID/GI strategy will be documented in the subsequent Annual Report and included within or as an addendum to the Stormwater Management Program (SWMP) Document.

Existing design, planning, and engineering strategies implemented by the City of Portland meet the requirements of this section and adequately prioritize the use of LID/GI for development and redevelopment projects. The policies, codes, or programs described in the following section support the use of LID/GI. Existing policies, codes and/or programs are subject to change as a result of updates, code changes, or rebalancing of City or State priorities (for example, through implementation of recommendations that will be issued by Governor Kotek's Housing Production Advisory Council by December 2023); changes will be described in annual reporting, as applicable.

2 LID/GI Strategies

2.1 Stormwater Management Manual

The City's Stormwater Management Manual (SWMM) provides policy and design requirements for post-construction stormwater runoff. The SWMM is the primary mechanism by which the City meets Schedule A.3.e of the MS4 Permit and it is described in detail in Strategy 2.5 of the SWMP document. All applicable new development and redevelopment projects in Portland on both private and public property must adhere to the City's stormwater retention, treatment, and low-impact development requirements. The SWMM is updated regularly; the current version is dated 2020, and the next anticipated update is in 2024.

A key feature of the SWMM is the stormwater management "hierarchy," which requires onsite retention and infiltration of stormwater to the maximum extent feasible from all impervious areas. When feasible, the City's standard is infiltration of the 10-year, 24-hour design storm event. Feasibility is based on measured infiltration rates as well as other site constraints (such as steep slopes or contaminated soils) that limit the ability for stormwater to percolate into the ground safely (refer to the SWMM for additional detail). This policy helps reduce effective impervious area, decrease the volume of stormwater discharged offsite, and decrease the discharge of pollutants to the storm system.

When onsite retention and infiltration of the 10-year storm event is infeasible, project designers are required to install stormwater controls that provide water quality treatment and flow control. In such cases, the City imposes a water quality treatment standard, requiring treatment of 90-percent of the average annual runoff. In addition, the City imposes flow-control requirements when needed to slow the runoff down and protect receiving waterways from erosion and flooding. The City's SWMM prioritizes the use of green infrastructure by requiring designers to use vegetated extended filtration systems to the maximum extent practicable. Vegetated facilities can also support runoff retention and evapotranspiration.

The SWMM also supports urban tree planting and preservation, another important component of LID/GI. Trees provide stormwater management benefits by intercepting precipitation (i.e., collecting rainfall on their leaves and branches), which provides some retention, facilitates evaporation, and delays runoff. Per the SWMM, tree credits can be used for new or existing trees in the right-of-way (ROW) to provide stormwater management for impervious surfaces, including sidewalks, driveways, and roads.

The SWMM provides guidance for stormwater reuse/rainwater harvesting if proposed for a development project. See the SWMM for additional information.

Lastly, the SWMM includes protections for drainageways and associated riparian areas. Drainageways are defined as constructed or natural channels or depressions that may at any time collect and convey water. Drainageway regulations support GI benefits by protecting the conveyance of flow in the channels themselves as well as protecting adjacent riparian areas. Drainageways and adjacent riparian areas function together to provide flow rate, flow volume, flood protection, and water quality benefits to the drainageway and to downstream receiving waters. These protections generally apply to smaller channels that are not adequately protected by zoning code regulations.

2.2 Comprehensive Plan

The City of Portland 2035 Comprehensive Plan, updated March 2020, is used to guide land use development and public facility investment decisions in Portland. The goals and policies of the plan are implemented through regulations, legislative and quasi-judicial land use decisions, agreements, and community development programs. The Comprehensive Plan includes the following policies that support limiting or reducing impervious surfaces as well as integration of LID/GI through development:

- **Policy 3.7 Integrate nature:** Integrate nature and use green infrastructure throughout Portland.
- **Policy 3.20 Green infrastructure in centers:** Integrate nature and green infrastructure into centers and enhance public views and connections to the surrounding natural features.
- **Policy 3.47 Green infrastructure in corridors:** Enhance corridors with distinctive green infrastructure, including landscaped stormwater facilities, extensive tree plantings, and other landscaping that provide environmental function and contribute to a quality pedestrian environment.
- **Policy 4.4 Natural features and green infrastructure:** Integrate natural and green infrastructure, such as trees, green spaces, ecoroofs, gardens, green walls, and vegetated stormwater management systems, into the urban environment. Encourage stormwater facilities that are designed to be a functional and attractive element of public spaces, especially in centers and corridors.
- **Policy 4.75 Low-impact development and best practices:** Encourage use of low-impact development, habitat-friendly development, bird-friendly design, and green infrastructure.
- **Policy 4.76 Impervious surfaces:** Limit use of and strive to reduce impervious surfaces and their associated impacts on hydrologic function, air and water quality, habitat connectivity, tree canopy, and urban heat island effects.
- **Policy 7.26 Improving environmental conditions through development:** Encourage ecological site design, site enhancement, or other tools to improve ecological functions and ecosystem services in conjunction with new development and alterations to existing development.

- **Policy 8.42 Stormwater management function:** Improve ROWs to integrate green infrastructure and other stormwater management facilities to meet desired level-of-service and economic, social, and environmental objectives.
- **Policy 8.43 Trees in rights-of-way:** Integrate trees into public ROWs to support City canopy goals; transportation functions; and economic, social, and environmental objectives.
- **Policy 8.71 Green infrastructure:** Promote the use of green infrastructure, such as natural areas, the urban forest, and landscaped stormwater facilities, to manage stormwater.

2.3 Zoning Code

The Portland City Zoning Code (Title 33) is intended to implement the Comprehensive Plan and related land use plans through base zone regulations, overlay zone regulations, plan districts, and additional use and development regulations. Multiple sections of the Zoning Code require or support the use of LID/GI for development projects. The following are key sections of the code that relate to LID/GI:

- **33.510 Central City Plan District:** Within certain zones in the Central City Plan District, new buildings with a net building area of 20,000 square feet or more must install an ecoroof that meets SWMM requirements. The coverage of the ecoroof depends on other proposed rooftop uses (such as solar panels, mechanical units, skylights, or common outdoor areas), but must cover 60% of the rooftop at a minimum. Currently, the City is considering a temporary suspension of this zoning requirement to reduce regulatory and cost barriers to housing production in Portland, with the goal of having this change in place by January 1, 2024. If this change is adopted, the suspension would eliminate the zoning requirement for ecoroofs on housing projects for a 5-year period but there would be no impact to non-residential development in the Central City; further, this zoning change would not impact the obligation for all projects to manage 100% of post-construction stormwater runoff per the SWMM.
- **33.537 Johnson Creek Basin Plan District:** Within the south subdistrict of the Johnson Creek Basin Plan District, no more than 50% of any site may be developed with impervious surface. The purpose of this regulation is to help mitigate the negative impacts that may result from the development of this area, where flooding and landslides are common.

- **33.248 Landscaping and Screening:** This chapter consists of a set of landscaping and screening standards and regulations for use throughout the City for development projects. The regulations address materials, placement, layout, preparation of the landscape or mitigation area, and timing of installation. Listed purposes of this chapter include reducing stormwater runoff pollution, temperature, and rate and volume of flow; preserving and enhancing Portland's urban forest; and promoting the reestablishment of vegetation in urban areas for aesthetic, health, and urban wildlife reasons. These landscaping regulations help support the use of GI for development projects.
- **33.430 Environmental Zones:** Chapter 33.430 includes protections for specific areas within Portland where significant resources and functional values are present. Two categories of environmental protections are applied: protection zones and conservation zones. Protection zones provide the highest level of protection to the most important resources and functional values and are the most restrictive; development is allowed only in rare and unusual circumstances. Conservation zones provide a less restrictive level of protection with the goal of conserving resources and functional values while allowing environmentally sensitive development. In general, environmental zones support protection and planting of native vegetation and limit development footprints in environmentally sensitive areas (such as near streams), both of which support the City's LID/GI strategy.
- **33.440 Greenway Overlay Zones, 33.475 River Overlay Zones:** The purpose of both the Greenway Overlay Zone and River Overlay Zone is to promote the protection, conservation, restoration, enhancement, and maintenance of the economic, natural, scenic, historical, and recreational qualities of lands along the Willamette River. These regulations control development of land and land uses adjacent to the river, balancing waterfront use and development with environmental protections to preserve and enhance natural resources.
- **33.653 Stormwater Management for Land Divisions and Planned Developments:** This chapter recognizes that stormwater facilities may be land-intensive and site-specific, consequently affecting the arrangement of lots and streets proposed through a land division or planned development. Before a land division or planned development is approved, development applicants must demonstrate that adequate space has been provided to accommodate stormwater facilities that meet SWMM requirements.

2.4 Other Strategies

- **Clean River Rewards:** The Bureau of Environmental Services offers customers a discount on their bill if their property has stormwater management solutions that infiltrate or reduce total runoff volume. Qualifying stormwater facilities include drywells, soakage trenches, rainwater collection, planters, and ecoroofs. In addition, customers can receive a discount if the property contains significant tree canopy.
- **Title 11 Trees:** Trees are an important component of Portland's GI. Title 11 seeks to enhance the quality of the urban forest and optimize the benefits that trees provide. It addresses tree protection and planting requirements in development and non-development situations for trees on private property, City property, and in the ROW. Requirements of Title 11 prioritize retention of larger trees as well as native trees and include replanting or mitigation payment requirements, depending on the situation.
- **Street Design:** The City supports the use of LID/GI to manage development and redevelopment in the ROW by ensuring that standard street design configurations accommodate stormwater infrastructure and street trees. Design standards and widths for public streets are described in TRN-1.09, which includes widths for scenarios with and without vegetated stormwater facilities. In addition, the Portland Pedestrian Design Guide (TRN-1.092) includes details regarding sidewalk corridor widths including stormwater facilities and street trees.
- **SWMM Planting and Title 33 Landscaping and Screening Requirements:** Development and redevelopment sites are often constrained in Portland, with limited space to meet all applicable development requirements. Related to stormwater management and LID/GI, one potential conflict is between SWMM planting requirements for stormwater management facilities and zoning regulations for landscaping and screening. To remove potential barriers to utilizing LID/GI, the SWMM was revised to clearly identify all plants that are listed in both the SWMM stormwater facilities plant list as well as the Tree and Landscaping Manual list of suggested plants that meet zoning regulations. In addition, BES revised setback requirements for vegetated facilities to allow a zero setback from the ROW, which allows sites to better meet landscape screening requirements with stormwater facilities. The goal of these changes was to make it easy for developers to design a vegetated stormwater facility that can also meet zoning regulations for landscaping and screening.

3 SUMMARY

The City's LID/ GI Strategy as described above outlines existing design, planning, and engineering strategies implemented by the City of Portland that prioritize the use of LID/GI for development and redevelopment projects.

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Appendix B

Infrastructure Retrofit and Hydromodification Assessment Update

November 1, 2023

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Background

The 2011 National Pollutant Discharge Elimination System Municipal Separate Storm Sewer System (NPDES MS4) permit required the City of Portland to conduct a hydromodification assessment and develop a retrofit strategy to address water quality from underserved areas. The 2021 permit requires the City to revisit those efforts to evaluate "lessons learned," list additional accomplishments, and discuss continued plans to address retrofits and hydromodification impacts moving forward.

With respect to retrofits, the City implements the Stormwater Management Manual (SWMM), which requires post-construction stormwater management for redevelopment activities, effectively adding treatment to untreated areas. In addition, the City implements programs related to installing green streets and stormwater facilities on public and private property, identifies retrofit projects as part of operations and maintenance activities, and implements pollution source control projects associated with the Portland Harbor Superfund site and Columbia Slough sediment. Finally, the list of water quality retrofit projects that were identified in the 2014 retrofit strategy have been constructed since that time, providing treatment of previously untreated stormwater from over 850 acres of impervious surface. The City will continue to identify new projects and some new water quality retrofit projects are planned as part of the Columbia Slough Sediment Program and BES's prioritized planning efforts.

With respect to hydromodification, since 2014, the City has worked to address informational gaps that were identified in the 2014 hydromodification assessment. This included a field survey of perennial streams and select intermittent streams. This information, along with the development of a new methodology to understand the geomorphic state of these streams, was used to provide a "condition ranking" and assess the need for remedial actions. Ten capital projects, some covering multiple outfalls, were implemented to address hydromodification impacts. These projects included outfall and culvert repairs, stream stabilization, and flow-reduction facilities. In addition, the City is planning continued updates to the SWMM to address flows associated with hydromodification impacts. Work is being conducted to support resilient stream corridors, and additional future projects have been identified at outfalls and road crossings for potential future implementation.

1 Introduction

Schedule A.5. of the City of Portland's 2011 Phase 1 NPDES MS4 permit (Permit) required the City to conduct a hydromodification assessment to examine hydromodification impacts related to MS4 discharges. These impacts include erosion; sedimentation; and alteration to stormwater flow, volume, and duration that may cause or contribute to water quality degradation. According to the Permit, the assessment was required to "identify strategies and priorities for preventing or reducing hydromodification impacts related to the co-permittees MS4 discharges and identify or develop effective tools to reduce hydromodification." The assessment was required for submittal to the Oregon Department of Environmental Quality (DEQ) by November 1, 2014.

Also included in the 2011 Permit, in Schedule A.6., was a requirement to develop a stormwater quality retrofit strategy, identified in a plan, which applied to developed areas that were identified as impacting water quality and underserved or lacking stormwater controls. The plan was required to include "a retrofit control measure project or approach priority list, including rationale, identification and map of potential stormwater retrofit locations where appropriate, and an estimated timeline and cost for implementation of each project or approach." This plan was also due to DEQ by November 1, 2014.

Schedule A.3.h. of the City's current 2021 NPDES MS4 Permit requires that by November 1, 2023, the City must "consider the impacts of policy, capital improvements, and retrofit projects on MS4 discharges to receiving waters, considering the goals and proposed actions described in the previous permit's Hydromodification Assessment and Stormwater Retrofit Strategy reports" (i.e., the 2014 submittals). Specifically, the City is required to prepare "an assessment of any outcomes related to the Hydromodification Assessment and Stormwater Retrofit Strategy reports." As stated in Schedule A.3.h.i, this assessment must include:

a) An assessment of how the Hydromodification Assessment and Stormwater Retrofit Strategy have been used, considered, or implemented since the time the reports were completed;

b) Progress toward or completion of projects identified in the Retrofit Strategy priority list, and a qualitative assessment of the benefits of those projects;

c) Description of any further actions taken as a result of the Hydromodification Assessment, and a rationale for those actions since the writing of the reports;

d) Narrative describing progress toward addressing gaps in the hydromodification information or data related to waterbodies within the co-permittees' jurisdiction as identified in the Hydromodification Assessment; and,

e) New goals, tools, priorities, and planned or potential projects for addressing ongoing hydromodification and/or water quality impacts resulting from historical development/infrastructure, and for improving retrofit planning, considering information gathered in the time since the completion of the reports.

The 2021 Permit requires the City to document this assessment in the third annual report (i.e., the 2023 annual report) as an appendix or subsection. This document is prepared to fulfill this requirement and is included as an appendix to the City's 2023 annual report.

Section 2 provides a summary of the 2014 Retrofit Strategy and progress made since it was submitted. Section 3 provides a summary of the 2014 Hydromodification Assessment and progress made since it was submitted. New goals related to stormwater retrofits and hydromodification are covered in Section 4.

2 Retrofit Plan Assessment

The City's retrofit strategy was documented in a Stormwater Retrofit Plan that was submitted to DEQ in 2014. In the 2014 Stormwater Retrofit Plan, the Bureau of Environmental Services (BES) identified measures, including policies and programs, that the bureau was implementing or planned to implement to improve stormwater management through retrofits. Between 2014 and today, these measures have been continued, completed and/or discontinued, or refined. A summary of these measures is provided in the following sections.

2.1 Ongoing Measures

The following measures were identified in the 2014 Retrofit Plan as driving stormwater retrofits, and they continue to be implemented by the City as discussed below.

Stormwater Management Manual

The City has implemented the SWMM since 1998 to address post-construction site runoff for new and redevelopment. The SWMM is described in detail in Section 2.5 of the City's Stormwater Management Plan, or SWMP Document. The SWMM identifies stormwater infiltration, discharge, flow control, and pollution reduction requirements, in addition to design guidelines, and related policies for all new development and redevelopment projects in Portland. The current SWMM requires all development projects to provide stormwater management for all new and replaced impervious area exceeding the 500 square foot threshold.[1] Much development in Portland occurs on previously developed sites, so each time a developed site is redeveloped, the area is brought into compliance with the SWMM. Additionally, the SWMM considers predevelopment conditions to represent an undeveloped site, so flow control requirements are targeted to match the flows of an undeveloped site rather than existing conditions. In essence, the stormwater management requirements that apply to redevelopment results in retrofits to the system and a net reduction in associated impervious area.

The SWMM has been updated twice since the 2014 Retrofit Plan was submitted; first in 2016 and most recently in 2020. Each iteration resulted in important changes to the applicability criteria and design standards, including criteria for determining which areas of impervious

[1] The City's current SWMM threshold is 500 square feet; however, the new MS4 permit pairs an increase of the threshold with more robust performance standards overall. By the November 1, 2024, deadline in the Permit, the City will evaluate alignment of the standards with the new permit requirements, which may include changing the City's threshold.

surface count as redevelopment were changed, which had the most impact for projects in rights-of-way. Relevant 2016 and 2020 SWMM changes included:

- Removal of exemptions for sidewalk, Americans with Disabilities Act (ADA), and safety projects; updated the definition of pavement maintenance; and stopped relying on a condition of whether a curb remained in place to determine the redeveloped area for projects in the right-of-way (ROW). A new process was added requiring sidewalk, pedestrian, and ADA projects to pay an offsite management fee without providing a project-specific engineering justification of infeasibility.

- Updates to address water quality treatment. The water quality design storm was increased to 1.61 inches in 24 hours to manage 90 percent of the average annual runoff. Requirements were clarified regarding the use of City pre-approved manufactured stormwater treatment technologies. A standard was added to require that these facilities be sized to treat the entire catchment area.

- Clarified SWMM applicability for "voluntary" retrofit projects, i.e., those that do not officially trigger the SWMM. Applicability was specified for three retrofit project types: City-required, state or federal required, or owner-initiated. City-required projects must meet full SWMM requirements, state or federal agency requirements must meet the requirements of the regulating agency, and owner-initiated retrofits are not required to fully comply with the SWMM but are encouraged to use it for guidance.

The next SWMM update is targeted for 2024. The update is expected to better align with the 2021 MS4 Permit, including the retention standard; propose options for streamlining pavement applicability; and expand the project types that prequalify to pay the offsite fee.

Green Streets

Green streets continue to be an important stormwater management tool in MS4 areas, where infiltration rates typically preclude the use of UICs, and manufactured filters are the other option for providing water quality treatment. They are a standard in the SWMM and are supported by the 2007 Green Streets Policy. BES is reevaluating the policy via a Green Street Core Team, including implementation and interpretation, and the overall approach to green street facilities. This work may result in changes to the current approach and to the policy itself.

The City adopted a policy in 2007 promoting the use of green streets in public and private development, resulting in the installation of hundreds of the stormwater management facilities

throughout Portland in subsequent years. While the policy was successful in terms of prompting the construction of many green streets, challenges have emerged. The dispersed population of typically small facilities makes it difficult to conduct needed operations and maintenance (O&M) activities, particularly with budget constraints. As Portland continues to experience hotter, drier, and longer summers, vegetation die-off in green street facilities has increased significantly, and replanting is necessary more often than originally anticipated. For these reasons and more, the City has begun to shift implementation of this policy by using or requiring green streets when they are the best suited for the situation. This improves the City's ability to build and maintain the storm system in a cost-effective way. This shift has resulted in building fewer green streets in the underground injection control (UIC) area and fewer lined green streets in the combined sewer overflow (CSO) system.

Technical Assistance, Incentives, and Grants

BES continues to manage the following programs that provide assistance, incentives, and grants for onsite retrofits and improvements to existing development.

- **Percent for Green program.** The Percent for Green program supports public and private projects that treat stormwater through a competitive grant funding process. Percent for Green grants are awarded to projects led by community groups, public agencies, and private developers to provide stormwater management facilities that are not required by the SWMM. The money can fund retrofit projects in the right-of-way, on private property, or on public property. Funds for this program come from one percent of city capital projects that disturb pavement but are not required to provide stormwater management (e.g., pavement repair and utility trenching), as well as offsite stormwater management fee payments to meet SWMM requirements.
- **Clean River Rewards program.** The Clean River Rewards program continues to serve as a discount program for people who safely manage some or all of their property's stormwater on their property. Once a property owner registers for the program and demonstrates how they are managing stormwater on their property, the discount is applied to the sewer and stormwater bill. The discount can be up to 100 percent of the onsite stormwater fee (35 percent of the total stormwater fee), depending on how much of the property's impervious area is managed safely.

  As part of the BES rate study, which will go into effect July 1, 2024, revisions to the program will better align qualification credits with SWMM compliance and more accurately account for impervious areas on a property. Revisions also require

pretreatment for commercial and industrial properties to qualify for the program when discharging to a private outfall.

- **Ecoroof technical assistance.** BES continues to support the installation of ecoroofs by providing resources and technical assistance to property owners and developers about the design and construction of ecoroofs as an effective stormwater management tool. The need for BES support has decreased significantly since 2014 due to its success in educating the private sector on the design, construction, and maintenance of ecoroofs. Since 2014, BES has worked closely with the Bureau of Planning and Sustainability (BPS) to create more incentives and requirements for ecoroof installation in the Title 33 Zoning Code. In particular, the Central City Plan district (33.510.243 Ecoroofs) requires new buildings in the CX, EX, RX, and IG1 base zones with a net building area of 20,000 square feet or more to have an ecoroof that meets the SWMM Ecoroof Facility Design Criteria.[2]

Operations and Maintenance Activities

During routine O&M activities, the City continues to identify opportunities and needs to retrofit the existing storm drainage system to improve stormwater management. This includes the addition of water quality and flow control facilities where appropriate and feasible.

Portland Harbor Superfund

The Portland Harbor Superfund site is a stretch of the Willamette River located roughly between the southern end of Sauvie Island and the Broadway Bridge. The City and DEQ have been collaborating for 20 years to identify and control sources of contamination to the municipal stormwater system, using the respective regulatory authorities. All significant sources to the City's stormwater conveyance system have been identified and referred to an appropriate state or municipal program for implementation of long-term source controls.

DEQ issued the City a conditional source control decision for the Portland Harbor municipal stormwater conveyance system in April 2021, which determined that the City's and state's ongoing programmatic source control measures are adequate to demonstrate that source control has effectively been achieved. The source control decision is conditional based on the

[2] Currently, the City is considering a temporary suspension of these zoning requirements to reduce regulatory and cost barriers to housing production in Portland, with the goal of having this change in place by January 1, 2024. If this change is adopted, the suspension would eliminate the zoning requirement for ecoroofs on housing projects for a 5-year period, but there would be no impact to non-residential development in the Central City; further, this zoning change would not impact the requirement that all projects must manage 100 percent of post-construction stormwater runoff per the SWMM.

City conducting 5 years of source control effectiveness monitoring on five outfalls per year. To date, the City has completed 2 years of effectiveness monitoring.

Columbia Slough Sediment Program Outfalls Predesign

The City has continued working to treat stormwater runoff from selected roadways in accordance with the Record of Decision (ROD), Intergovernmental Agreement (IGA) (signed by BES and DEQ in 2016 and updated in 2021), and Watershed Action Plan (WAP) in selected City stormwater basins. BES is currently working on numerous stormwater outfall basin capital improvement program (CIP) projects to improve water quality, and, where possible, to reduce the volume of stormwater runoff flowing into the Columbia Slough via the City's stormwater conveyance system. Project details are provided in Section 4.

The *2021–2022 Annual Report: Columbia Slough Sediment Cleanup Program*[3] contains a complete documentation of the current status of all Columbia Slough outfalls subject to the ROD and IGA.

2.2 Project Completion and Benefits

The City completed projects listed in Tables 1 and 2 of the 2014 Retrofit Plan, including selected projects from the Stephens Creek Stormwater System Plan, with some variation in final design and construction. A summary is included below, and project details can be accessed by entering the CIP number in the Job Number field here.

These completed projects provide numerous benefits within and downstream of the neighborhoods they have been installed in. Sediment and pollution entering the Stephens, Fanno, and Tryon Creek watersheds has been reduced. Sediment and pollution entering the Columbia Slough has also been reduced. Facilities and other retrofits attenuate flows and improve habitat, while some projects have helped to protect and improve eroded embankments and stream corridors. In addition, green street facilities provide ancillary greening benefits beyond stormwater management and can help to reduce traffic speeds and improve pedestrian and other active transportation safety.

[3] BES and DEQ. 2023. *2021-2022 Annual Report: Columbia Slough Sediment Cleanup Program.* Prepared by City of Portland, Bureau of Environmental Services and Oregon Department of Environmental Quality. January 2023.

Public Stormwater Quality Facilities

All projects listed in *Table 1. Projects during FY2013-2014* in the 2014 Stormwater Retrofit Plan were completed and constructed.

Projects in Fiscal Years 2014-15 and 2015-16

All of the projects except one were completed as listed in Table 2 of the Retrofit Plan. These included the following:

- Beaverton-Hillsdale Highway Drainage Retrofits (CIP Number E08675): Five stormwater planters and six Contech StormFilter catch basins were installed to attenuate flows and provide pollution reduction for stormwater runoff from 26 miles of Beaverton-Hillsdale Highway prior to discharging to Fanno Creek.
- Stephens Creek Headwater Neighborhood Stormwater Facilities (CIP Number E10596): This stream enhancement project manages stormwater flows and enhances water quality and habitat.
- Stephens Creek Tributary Outfall Repair (CIP Number E10579): Five outfalls in the Stephens Creek watershed (a subwatershed of the Willamette) were repaired, replaced, or relocated to correct structural deficiencies and to protect severely eroded embankments and stream corridors.
- Outfall 77a Stormwater Treatment Facilities (CIP Number E10560): Contech StormFilter vaults were installed with a sedimentation maintenance hole to treat runoff from Columbia Boulevard prior to discharge into the Columbia Slough through Outfall 77a.
- Treatment facilities for the SW Stephenson/Hamilton Drainage/Road Improvements (CIP Number E10131): Green street and shoulder improvements were made on SW Hamilton to treat and retain stormwater.
- NE 112th and Marx LID Treatment Facilities (CIP Number E10408): This Local Improvement District (LID) installed pavement, lighting, landscaping, and green street facilities along NE 112th and NE Marx. Stormwater on these sections of road are now treated prior to discharge into the Columbia Slough.

- Safe Routes to School Stormwater Treatment Facilities 2013 (CIP Number E10571): Two green street curb extensions manage 32,900 square feet of runoff from NE 102nd Avenue that would otherwise drain to the Columbia Slough.
- Fanno and Tryon Drainage Shoulder Improvements (CIP Number E10373): This project completed ditch-to-swale improvements along SW Stephenson and SW Hamilton to provide stormwater improvements along constrained rights-of-way in southwest Portland.
- SW Boones Ferry and Stephenson Green Street (CIP Number E10145): Intersection improvements and green streets were installed to retain and treat stormwater from SW Boones Ferry and SW Stephenson Street prior to discharge into a tributary of Tryon Creek.
- NW Front Avenue Green Street (CIP Number E10638): Two green street facilities were installed to treat stormwater from portions of NW Front Avenue prior to discharge into the Willamette River.

One project, N Lagoon Green Street (CIP Number E10637), was funded for completion in FY 2016-2017. Unfortunately, the project had to be cancelled after unavoidable underground utility issues were found along N Lagoon Avenue.

Additional projects to address hydromodification impacts could also be classified as retrofits. These projects are described in Section 3 of this assessment.

Projects Completed Since FY 2015-2016

In addition to the projects listed in the 2014 Retrofit Plan discussed above, BES has continued to install stormwater retrofits throughout our MS4 basins. The following table describes stormwater retrofit projects that have been completed since FY 2015-2016. In total, these projects resulted in approximately 314 acres being treated. Some of these projects also addressed hydromodification impacts and are also described in Section 3 of this assessment.

Table B-2.1: Projects Completed Since FY 2015-2016

Watershed	Project Description	CIP Number	Area Treated (acres)	MS4 Outfall
Columbia Slough	Five green streets were installed to manage 25,900 sf of NE 185th built by a private developer to meet development requirements.	EP244	0.6	AAW440
Columbia Slough	Over 50 green street facilities were installed to treat stormwater runoff from roughly 30 acres of City ROWs.	E10625	200	104B
Columbia Slough	Swale constructed with a PBOT interagency street improvement project to manage 52,000 sf of N Burgard Road.	E10676	1.2	AAA287
Columbia Slough	Green streets constructed with a PBOT interagency street improvement project to manage 25,800 sf of N Lombard Street.	E10968	0.6	AAA287
Columbia Slough	Two green streets to manage 2,740 sf of NE 103rd Ave. Built by a private developer to meet stormwater requirements.	EP145	0.1	AAP316
Columbia Slough	Two green streets to manage 3,100 sf of NE Sacramento St. Built by a private developer to meet stormwater requirements.	TH0237	0.1	OF113
Columbia Slough	City ROW project including the installation of two green streets to manage street runoff.	TH0818	0.3	OF60
Columbia Slough	Subsurface stormwater treatment facilities and green streets to treat stormwater runoff from City ROWs in Parkrose neighborhood.	E10689	22	100
Fanno Creek	Construction is underway on a project to improve stormwater management for water quality and stream health.	E08675	4	ANJ675, ACG027
Fanno Creek	Three green streets to manage 2,300 sf of SW 18th Drive. Built by a private developer to meet development requirements.	EP321	0.1	ACM514
Fanno Creek	Two green street planters to manage 4,800 sf of SW Canby St. and SW 40th Ct. Built by a private developer to meet stormwater management requirements.	EP242	0.1	ACR587
Fanno Creek	Interagency project with PBOT to provide stormwater treatment for LID to improve the City ROW, including the installation of two green street facilities in Southwest Portland along SW 47th Ave.	E10950	0.3	AQB886
Johnson Creek	Stormwater basin and road improvements to treat 1.2 ac of impervious area that drains to a wetland adjacent to Johnson Creek.	E08406	1.2	ARC949
Johnson Creek	Three green streets to manage 6,300 sf of SE 162nd Avenue and one regional swale to manage 72,800 sf of SE 160th Avenue, SE Spokane Court, and SE Tenino Court. Built by a private developer to meet development requirements.	EP118	1.8	ACV532
Johnson Creek	Repair eroding streambed and banks of Johnson Creek that were damaged after a FEMA-declared disaster flood event (December 2015).	E10854	NA	NA
Tryon Creek	Along with PBOT, constructed a green street and stormwater facility to address water quality from unimproved roadway.	E10672	3.7	ADD172

Watershed	Project Description	CIP Number	Area Treated (acres)	MS4 Outfall
Tryon Creek	One green street to manage 6,300 sf of SW Spring Garden Ct. Built to meet stormwater requirements by the City as part of an interagency improvement project funded by a local improvement district.	E10777	0.1	ACX487
Tryon Creek	Remove an undersized culvert and replace with a bridge to improve fish passage at SW Boones Ferry Road at SW Arnold Street (confluence of Arnold and Tryon Creeks).	E08682	0.6	Near ANT403
Willamette River	One green street and revegetation of roadside swale to treat 3,590 sf of roadway runoff prior to discharge in the headwaters of channel in Riverview Natural Area.	E10769	0.08	ADH777
Willamette River	Constructed Centennial Oaks Stormwater Project to treat parking lot and roadway runoff.	E10153	1.4	OF01
Willamette River	Restoration of failing culverts along Leif Erikson Drive in Forest Park to address hydrology, scouring and sediment in runoff.	E10710	N.A.	OFs 22C & 22D
Willamette River	Two green streets to manage 24,150 sf of NW Front built by a private developer to meet development requirements.	EP209	0.6	OF13
Willamette River	Repair three outfalls in the Stephens Creek subwatershed.	E10579	N.A.	ACT031, ACY374, ACY378
Willamette River	One green street (Facility #7) to manage 7,300 sf of the SW Bond Avenue project.	E10773	0.2	OF07B
Willamette River	Replacement of an undersized culvert with an open-bottom culvert to improve connectivity between the Refuge and the Willamette River.	E08576	75	N.A.
Willamette River	One green street to manage 1,500 sf of SW Idaho St. Built by a private developer to meet stormwater management requirements.	EP306	0.1	ACS082
Willamette River	One of three projects at the Stephens Creek Headwaters to manage stormwater flows and enhance water quality and habitat. SW 26th Avenue and Texas Street.	E10911	TBD	ACS140 (Custer)
Willamette River	City ROW project including the installation of two green streets to manage street runoff at SW 4th Avenue and Montgomery Street, and SW 3rd Avenue and Harrison Street.	TH0251	0.1	OF08
Willamette River	Upgrade and repair the Balch Creek trash rack in Lower MacLeay Park.	E10583	NA	ABB702

Stephens Creek Stormwater System Plan

The Stephens Creek Stormwater System Plan (SCSWSP) was developed in 2013 as a pilot for BES's Stormwater System Plan. The SCSWSP used an asset management approach to stormwater management that prioritized projects to protect, improve, and maintain stormwater infrastructure, including stormwater management retrofits. The SCSWSP stormwater project recommendations included mitigating erosion associated with City-owned stormwater outfalls on tributaries of Stephens Creek, constructing three regional detention and pollution reduction facilities in the headwaters of the watershed, and constructing stormwater management retrofits for City streets. Phase 1 project recommendations, including two of the projects listed in Table 2 of the 2014 Stormwater Retrofit Strategy (and bulleted above), were designed and constructed (i.e., the Stephens Creek Headwater Neighborhood Stormwater Facilities, and the Stephens Creek Tributary Outfall Repair).

The Stephens Creek Program (SCP) implemented many of the recommendations made in the SCSWSP. The process of developing the SCSWSP served as a pilot for citywide stormwater system planning, and the SCP served as a pilot for implementing a stormwater system plan. A stated intent of the SCP was to apply lessons learned in implementation back to the citywide Stormwater System Plan (SWSP) and vice versa. Some of the lessons learned and documented by the SCP include the need for integrated implementation, basin wide outreach, private property retrofits on Portland's west side, establishment of a fund to partner with the Portland Bureau of Transportation on street improvements to facilitate incorporation of green facilities, neighborhood-scale stormwater management facilities, and street tree planting. Recommendations and lessons learned have been considered and implemented as part of the BES's reorganization into functional groups and the creation of a Project Management Office (PMO) to deliver the CIP effectively and efficiently through a revised CIP Delivery Process.

3 Hydromodification Assessment

The 2014 Hydromodification Assessment Report highlighted a need for the City to collect more data related to the geomorphology of the region's streams. "Geomorphology of streams" refers to interactions between the physical structure of streams, the water and sediment transport processes, and the landforms created. This information helps increase understanding of where hydromodification impacts may be occurring and potential areas suitable for mitigation. The gaps identified in the 2014 Hydromodification Assessment included isolated stream locations that had not been surveyed and were identified by residents who called the BES drainage complaint line.[4] This highlighted a need to have a more complete citywide survey to avoid the bias incurred when responding to complaint calls, and the decision was made to look broadly at stream conditions.

In 2018, the City contracted with the Oregon Department of Fish and Wildlife (ODFW) to survey perennial streams within the urban boundary and to conduct a sampling of significant intermittent streams using the Aquatic Inventory Project stream habitat survey protocol. The baseline information collected in the ODFW survey includes channel metrics such as active channel height and width and flood-prone height (together these metrics are used to determine the reach type and entrenchment ratio[5]). Baseline information also includes wood presence, substrate, and vegetation growth. This information was used to assign overall condition rankings to perennial streams within City boundaries.

Additionally, in 2020, the City hired two consulting firms specializing in geomorphic assessments to develop a methodology defining the current geomorphic state, anticipated trends, and function of the streams. This effort involved the development of field protocol, mapping, and a reporting structure to provide information necessary to guide stream assessments, manage sewer assets located in or adjacent to waterways, and anticipate the future impacts of hydromodification in Portland watersheds. The field method was developed to support the City's hydromodification and stream infrastructure risk assessment. Specifically, the field methods:

[4] The Drainage Complaint Hotline exists for private property owners to call or email with concerns about drainage issues on their property. Website: Request Technical Assistance for Drainage Issues on Your Property | Portland.gov.

[5] Entrenchment ratio is the ratio of the width of the flood-prone area to the surface width of the bankfull channel. It is measured at the elevation that corresponds to twice the maximum depth of the bankfull channel. The entrenchment ratio indicates a stream's potential to interact with its floodplain.

- Assess the stream channel to estimate and evaluate the degree of incision, channel complexity, evolutionary stage, and other reach-scale geomorphic conditions within each stream reach.
- Identify which reaches that have floodplains could potentially be reconnected through active management, and which reaches lack floodplains due to geologic and anthropogenic constraints.
- Interpret the recent trajectory of the stream's vertical and lateral changes (e.g., incising, aggrading, widening, narrowing, or stable) and characterize the anticipated future trajectory of each stream reach under a "no action" scenario.
- Identify, as appropriate, potential management actions that may benefit stream health within the assessed reaches.

The pilot methodology ranks streams from 1 to 5 for incision severity/floodplain connectivity; bank erosion severity; channel complexity; wood abundance; susceptibility to hydromodification; and rehabilitation potential.

The generalized findings from the 2014 Hydromodification Assessment indicated a clear need for more data, particularly in areas of the City that are undergoing new development and that face added pressure to increase density to accommodate growth. At this time, the geomorphic assessments are limited to areas identified by BPS as susceptible to future development pressure, including selected creeks in southwest Portland, as well as Tryon Creek and its headwater tributaries. The City continues to evaluate stream geomorphology and downstream capacity for stormwater conveyance, locations where there are opportunities to provide mitigation and repair erosion, and potential consequences associated with stormwater conveyance to natural stream functions. In the future, the City may survey other creeks in areas with development pressure that are potentially susceptible to hydromodification. The creeks covered in the current survey were chosen based on the surrounding landscape, the stream's predicted susceptibility, and expected growth in the immediate watershed.

3.1 Implementation and Considerations

The 2014 Hydromodification Assessment included the Fanno and Tryon watersheds, Johnson Creek watershed, and the subwatersheds of the western tributaries of the Willamette. The larger Willamette and Columbia Rivers and the Lower Columbia Slough were excluded from the assessment because the City MS4 stormwater discharges account for a very small fraction of a

percent of the total flow in those waterbodies. The middle and upper Columbia Slough were not included because those segments of the watershed are managed by the Multnomah County Drainage District for both water level and flow, and they are not free-flowing (i.e., they are managed through pumping).

The assessment looked for impacts of hydromodification on streams within the City's MS4 area, and it looked at potential sources of hydromodification. Potential impacts were identified through historical field observations by BES staff and community reports to the BES drainage complaint hotline. Potential sources of hydromodification were highlighted and ranked using the Stormwater Release Potential (SRP) model, as described in the *2014 Hydromodification Assessment Report*. This model compared predevelopment conditions to then-current (2014) conditions to measure alterations in surface hydrologic characteristics. The model then divided the scores into unlikely source areas, marginal source areas, and likely source areas.

The assessment identified several hydromodification impact sites related to the City MS4: 12 in the Fanno/Tryon watershed, 11 in the west Willamette tributary subwatersheds, and 11 in the Johnson Creek watershed. Most impacts were "near-field" (i.e., related mostly to the concentration of flow energy around an outfall pipe). Few "far-field impacts" (i.e., beyond the direct influence of outfall hydraulics), were identified.

3.2 Project Completion and Benefits

Since 2014, the City has completed several CIP projects to address hydromodification impacts throughout the watersheds noted above. Some of these projects are also listed in the retrofit list in Section 2, as they address both water quality and hydromodification issues. The projects are summarized below and can be accessed for more details by entering the CIP number in the Job Number field here.

- Stephens Creek Tributary Outfall Repair (CIP Number E10579 - completed 2017): Five outfalls in the Stephens Creek watershed (a subwatershed of the Willamette) were repaired, replaced, or relocated to correct structural deficiencies and to protect severely eroded embankments and stream corridors.
- Fanno/Tryon Outfall Maintenance (CIP Number E08677 - completed 2014): Four outfalls in Fanno Creek and one in Tryon Creek were repaired to provide energy dissipation and reduce erosion of the stream banks.

- Leif Erikson Priority Culvert Repair (CIP Number E10710 - completed 2017): Three culverts were replaced in Forest Park on unnamed streams (in the subwatershed of the Willamette). To alleviate erosion at the outfalls, simulate natural stream flow conditions, and reduce increased flow velocity through the culverts, the culverts were embedded 16 inches in the ground with native streambed material in the base of the pipe.
- Fanno Creek At SW 45th Ave Culvert Replacement (CIP Number E08676 – completed 2017): An undersized culvert in Fanno Creek was replaced at SW 45th Street, resulting in improved fish passage, restoration, and stabilization of stream banks upstream and downstream of the new culvert to minimize erosion and limit impacts on water quality.
- Fanno Beaverton Hillsdale Hwy Planters (CIP Number E08675 – completed 2017): Five stormwater planters and six Contech StormFilter catch basins were installed to attenuate flows and provide pollution reduction for stormwater runoff from 26 miles of Beaverton-Hillsdale Highway prior to discharging to Fanno Creek.
- Johnson Creek Oxbow Scour Repair (CIP Number E10996 – completed 2019): Repairs along the outer banks of the Johnson Creek Oxbow were made to reduce bank erosion to provide improved water quality and enhanced riparian and channel habitat.
- Tryon Creek at Boones Ferry Rd Culvert Replacement (CIP Number E08682 – completed 2020): An undersized culvert was replaced with a bridge over Tryon Creek at SW Boones Ferry Road to restore stream flows to a normative hydrograph, protect in-stream habitat, minimize channel erosion, and limit impacts on water quality.
- Luther Road Project (CIP Number E10854 – completed 2019): Luther Road restoration of Johnson Creek provided establishment of new floodplain, habitat improvements, and installation of a regional stormwater quality facility.
- South Ash Creek Stream Enhancement (CIP Number E09105 – completed 2015): South Ash Creek Stream Stabilization involved installation of a series of stream bed stabilization structures, stream and bed grading, and establishment of riparian vegetation.

- Albert Kelly Park Stream Daylighting (CIP Number E10824 – completed 2017): Albert Kelly Park Stream project daylighted the headwaters of a tributary to Fanno Creek and reestablished natural flow and processes.

3.3 Further Actions

The City has been performing long-term stormwater system risk assessment and planning that includes elements related to reducing or minimizing hydromodification impacts. Stormwater system planning utilizes a Risk Assessment Framework Tool, which enables BES to look citywide at potential risks to the stormwater system. Part of this assessment reviews in-stream hydrologic impacts. As a result of work done for the 2014 Hydromodification Assessment, the SRP model was incorporated into this assessment tool and refined to identify streams with a higher likelihood of upland modifications that could result in hydromodification impacts and in-stream erosion.

The City's SWMM is a critical tool in the work to mitigate hydromodification effects and prevent further negative impacts. As discussed previously, the SWMM has been updated twice since the 2014 report, once in 2016, and again in 2020. The 2020 SWMM updated the stormwater infiltration and discharge hierarchy to emphasize the importance of retention. It included onsite infiltration in a vegetated facility or UIC as top preferences for facilities used in the City's infiltration and discharge hierarchy. These facility types used to be placed in separate categories, with a lower preference for UICs. Flow control requirements were improved by including orifice control for larger projects and updating requirements for sites draining to surface streams. The new standards require limiting the one-half of the 2-year post-development peak runoff rate to one-half of the 2-year predevelopment peak rate. These changes improve control of frequent flows that cause most hydromodification impacts.

Impact sites identified in the 2014 Hydromodification Assessment came from the community and interviews with in-house staff. The City determined that a broader assessment was needed to understand the scope of problems identified. Additionally, near-field impacts from inadequate energy dissipation at outfalls required further study to determine if the issue was just a matter of energy dissipation alone, or if other factors contributed to the alteration of the hydrology and/or sediment supply to the receiving stream. Taking these other factors into account may provide a more representative picture of the factors potentially impacting a given stream.

From 2017 until 2019, BES implemented a culvert inspection program that included a Culvert End Inspection that would be applied at both the upstream and downstream sides of a culvert. Observations and assessments of the culvert end included appurtenance features (apron, bioengineered, flared end section, headwall, wingwalls, screen/grate, riprap, rock-fille wire basket/mattress); culvert end problems (pipe misaligned with stream, debris, erosion or scour, sediment, structural defect including bank slopes and trench settlement/cavities); and grade misalignment (buried or perched). During culvert inspections, these culvert end aspects are now recorded and included in the condition rankings. Thirty-six percent of the City's culverts have been inspected to date, and BES is considering additional assessments as the budget allows.

4 Future Goals and Priorities

The following section summarizes goals, priorities, tools, and planned or potential projects related to stormwater retrofits and hydromodification. These efforts will be carried out to the extent that the City budget and related executive leadership decisions allow. (Section 3 of the FY 2022-23 MS4 Annual Compliance Report describes constraints the City is facing that may impede or prevent future goals and priorities related to stormwater retrofits and hydromodification.)

4.1 Retrofit Planning Activities

The following subsections summarize goals and priorities, tools, and planned or potential projects for addressing water quality impacts from historical development through retrofit planning efforts.

Strategic Asset Management

BES recently began developing a Strategic Asset Management Plan (SAMP) that considers the history and current state of the community, BES service delivery and assets, and desired outcomes in the years ahead. While an organization's asset management objectives are typically focused on asset portfolio objectives, the BES approach highlights equitable service delivery with a focus on services to Portland communities and what community members want to see and experience. The SAMP will be used to inform an overall approach to stormwater system retrofitting and related priorities.

Private Property Retrofits

The Private Property Retrofit Program (PPRP) installs stormwater management facilities on private property to support BES's service goals and mission. Although the PPRP has historically focused on residential and commercial properties, the Kenton and Piedmont Priority Outfalls Plans are piloting an application of the PPRP on industrial and commercial basins within their planning boundaries. PPRP is currently working in select basins within the Columbia Slough watershed to support the capital stormwater treatment projects identified by these planning efforts on properties without stormwater permits and stormwater management plans.

Drainage Inquiry Hotline

As mentioned previously, BES maintains a drainage inquiry hotline both by phone and email for community members to reach out about stormwater issues on their property. Through this hotline, BES provides technical assistance citywide for stormwater issues and answers questions on private property, as well connects property owners to additional resources to retrofit stormwater management on private property.

4.1.1 Future Retrofit Project Efforts

Columbia Slough Sediment Program Priority Outfalls

As described in the *2021–2022 Annual Report: Columbia Slough Sediment Cleanup Program*, the City will continue integrated planning through the Kenton Priority Outfall and Piedmont Priority Outfall Plans for MS4 Outfalls 59, 60, 61, 61a, 62, 62A, 63, 64, and 65A. These two planning efforts will result in a combination of capital and programmatic recommendations to ensure stormwater in these MS4 basins is adequately treated and managed prior to discharge to the Columbia Slough. Capital solutions being considered include pervious pavement, green streets, filter vaults, and sediment maintenance holes, among others. Engineering design for stormwater treatment of selected City rights-of-way in Outfalls 57, 58, 65, and 73A will continue, and construction is expected.

Integrated Planning Opportunities

BES has an integrated planning process that assesses risks to sewer systems and residents and then prioritizes planning in specific geographies, asset types, or systems to address those risks. Even if the identified risks are specific to something other than stormwater management, the integrated process allows for an early characterization of issues and opportunities within the planning area such that stormwater retrofit projects may also be identified. BES is currently moving forward with the following plans that include retrofit opportunities or early exploration:

- West Portland Town Center Systems Plan: City Council adopted the West Portland Town Center Plan (WPTC) Plan in November 2022. The WPTC Plan calls on BES to develop a system plan for the WPTC Plan study area. The system plan, currently underway, will include an evaluation of sanitary sewer, storm sewer, and surface water systems, and then recommend integrated solutions across all three systems to meet the increased service demands forecasted in the study area. As the system plan is anticipated to

recommend significant capital asset investments, a CIP project has been created: the West Portland Town Center Systems Development Plan (CIP Number E11342).

- Sullivan, Stark, and Holladay Combined Sewer Basin Improvements: Condition and capacity issues have long been a concern in the Sullivan, Stark, and Holladay combined basins, which prompted previous analyses of the potential to separate stormwater from the combined system in the area. The basins have significant growth potential, as identified in the City's Buildable Lands Inventory and recent interest from the Albina Vision Trust and Oregon Department of Transportation in the area near the Moda Center and pending development proposals for significant increases in development at Lloyd Center Mall. Given the high level of interest in development in this area, the existing capacity and condition issues, and the need for clarity on what improvements are needed and who will be responsible for them, BES's integrated planning process will explore solutions that may include separating the combined sewer.

4.2 Hydromodification Goals

The following subsections summarize upcoming hydromodification assessment goals and priorities.

Updated Hydromodification Approach

To address ongoing hydromodification impacts and provide future guidance, the City identified the need for an updated strategy. BES will be considering a multi-faceted approach, including:

- New regulatory and design strategies in the SWMM to mitigate stormwater runoff from development projects;
- Development of regional stormwater facilities to mitigate existing urbanization impacts (to the extent practicable), and;
- Stream restoration through fortification and stabilization with a focus on providing habitat and stream function.

Stream stabilization would be designed to protect existing crossing or adjacent sewer and roadway infrastructure and private property (including structures as appropriate).

In 2021, the City hired a water resource consulting firm to develop a watershed-specific Hydromodification Assessment Strategy to provide an in-depth analysis of the various hydromodification influences, impacts, and potential mitigation strategies for the upper Tryon

Basin in southwest Portland. This area was selected due to increased pressure to provide stormwater service to new and intensive development to accommodate new zoning changes related to infill development,[6] a potential new town center, and an extension of a light rail transit line and associated growth. Once the assessment strategy is completed, the City will determine how to develop policies to incorporate the solutions. Lessons learned from this effort will be applied throughout the City as appropriate.

SWMM Update

The City will complete an update to the SWMM in 2024. One of the primary changes under consideration is increasing onsite retention for storms that are less than the current 10-year event. This would add a step in the hierarchy for postconstruction development to manage stormwater in MS4 basins. Increasing onsite retention will reduce hydromodification impacts by focusing on infiltrating smaller, frequent events and is necessary to comply with the new retention standards in the MS4 permit. To facilitate increased retention requirements for smaller events, work is being done to evaluate feasibility, geotechnical risk, relationship to flow control for larger events, and facility design changes. The geotechnical considerations are of particular concern, as parts of the MS4 system exist in the West Hills, which are characterized by soils with low infiltration rates, shallow layers of fragipan, steep slopes, and significant shallow and deep landslide hazard areas. These geological conditions make any amount of infiltration challenging from a technical and regulatory perspective.

The City will continue working with consulting firms in a future phase of contracting to better define and test the options described above and seek out other measures that can help identify and meet hydromodification goals.

[6] Residential Infill Project – updated June 30, 2022
https://www.portland.gov/bds/zoning-land-use/residential-infill-project

4.2.1 Future Hydromodification Project Efforts

Other potential projects have been identified and will be considered for implementation in the future as budget and funding allow. Examples include the following:

- The proposed replacement of a road-crossing culvert in Fanno Creek where it crosses SW Shattuck Road. The proposed project includes stream restoration work upstream and downstream in areas immediately adjacent from the culvert to control the grade of the creek and repair eroding banks that are contributing to water quality problems (CIP Number E10691).
- Two outfalls and a culvert in the Stephens Creek watershed are proposed to be repaired to stabilize the outfalls and reduce hazards from the continued erosion and failure of those assets (CIP Number E11186).
- A stormwater system and stream/drainage stabilization master plan for the Rocky Butte community (CIP Number E11152).
- A West Lents Outfalls Feasibility Study that focuses on water quality in areas tributary to Johnson Creek in and around SE 92nd Avenue (CIP Number E11157).
- Lowell and Ruby Creek restoration to address erosion and instability issues from hydromodification that have led to exposure and damage to sanitary sewer infrastructure (CIP Number E11147).

PART II

PORT OF PORTLAND

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PORT OF PORTLAND

National Pollutant Discharge Elimination System
Municipal Separate Storm Sewer System Permit

ANNUAL REPORT NO. 28

July 1, 2022 – June 30, 2023

Permit Number 101314

Prepared for:
Oregon Department of Environmental Quality

November 1, 2023

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Abbreviations

BMP	best management practice
CAP	Corrective Action Plan
City	City of Portland
CSWC	Columbia Slough Watershed Council
DEQ	Department of Environmental Quality
DSM	Design Standards Manual
FAA	Federal Aviation Administration
IDDE	Illicit Discharge Detection and Elimination
IGA	Intergovernmental Agreement
IPM	integrated pest management
LID	low impact development
MEP	maximum extent practicable
MFM	Marine Facilities Maintenance (Marine's general maintenance group)
MS4 Permit	NPDES Phase I MS4 Permit
MS4	Municipal Separate Storm Sewer System
MX	PDX Maintenance
NPDES	National Pollutant Discharge Elimination System
PDX	Portland International Airport
Port	Port of Portland
SPCC	Spill Prevention Control and Countermeasure
SWMP	Stormwater Management Plan
SWPCP	Stormwater Pollution Control Plan
TMDL	Total Maximum Daily Load
USB	Urban Services Boundary
WPCF	Water Pollution Control Facility

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Section 1: Introduction

The Oregon Department of Environmental Quality (DEQ) regulates stormwater runoff from Port of Portland (Port) property through the Municipal Separate Storm Sewer System Discharge Permit No. 101314 (MS4 Permit) and other National Pollutant Discharge Elimination System (NPDES) stormwater permits, including the 1200-Z, 1200-CA and Individual permits. This annual report describes activities specifically related to implementation of the Port's MS4 Permit.

The Port and City of Portland (City) are co-permittees on MS4 Permit No. 101314. As required under Schedule B.3 of the permit (2021 MS4 Permit), each co-permittee must submit an annual report. This report documents activity from July 1, 2022, to June 30, 2023, related to the Port's stormwater management efforts under the MS4 Permit and associated November 1, 2022 (revised October 3, 2023) Stormwater Management Plan (SWMP). This report emphasizes efforts and activities associated with individual best management practices (BMPs) from the Port's SWMP (as summarized in Section 7.0). Schedule B.3 of the 2021 MS4 Permit states the specific annual reporting requirements. These requirements are addressed within the report as follows:

a. **Status of SWMP implementation:** Section 7.1.1 through 7.1.9
b. **Summary of the adaptive management process:** Section 8.0
c. **Proposed changes to the SWMP to reduce Total Maximum Daily Load (TMDL) pollutants:** Section 8.0
d. **Summary of education and outreach and public involvement activities**: Section 7.1.1
e. **Summary describing enforcement actions and the results of the dry-weather field screening and Illicit Discharge Detection and Elimination (IDDE) follow-up activities**: Section 7.1.3
f. **A list of entities referred to DEQ for 1200-Z permit coverage**: See the City of Portland's Annual Report Section 2.0.
g. **Summary of stormwater program expenditures**: Section 4.0
h. **Summary of monitoring results:** See Section IV Monitoring Compliance Report of this combined annual report. Section 6.1 of this document explains the Port's monitoring coordination with the City.
i. **Proposed changes to the monitoring plan:** *See Section IV Monitoring Compliance Report of this combined annual report. Section 6.1 of this report explains the Port's monitoring coordination with the City.
j. **Overview of concept planning, land use changes, and new development:** Section 2.1 and Section 9.0.
k. **Details of any corrective actions implemented:** Section 9.

l. **Additional Annual Report requirements for 2023:**

- Low Impact Development (LID) Strategy: Appendix A,
- Construction Escalating Enforcement Procedures: Appendix B, and
- Infrastructure Retrofit and Hydromodification Assessment Update: Appendix C.

As mentioned above, this report is based on the Port's 2022 SWMP. Per the 2021 Permit requirements, the Port submitted a new 2022 SWMP to DEQ for approval in conjunction with the submittal of this annual report on November 1, 2022. The 2022 SWMP was approved by DEQ on December 16, 2022. As anticipated this year's annual report will reflect implementation of the Port's 2022 SWMP. The Port made one change to the 2022 SWMP during FY2023 to document their updated construction enforcement procedures (See Section 7.1.4). The revised SWMP is posted on the Port's Stormwater Management page of their public website https://portofportland.com/Environment/StormwaterManagement.

Section 2: Port of Portland Permit Area and Responsibilities

The Port of Portland owns approximately 5,478 acres within the City Urban Services Boundary (USB). Port property is divided into three primary Business Lines, plus a fourth division composed of undeveloped property:

1) Aviation
2) Marine
3) Industrial Development
4) Undeveloped Property[1]

Within the City USB, the Aviation Business Line consists of Portland International Airport (PDX), and the Marine Business Line includes Marine Terminals 4, 5, and 6 (T4, T5, and T6). The Industrial Development Business Line consists of Terminal 2 (T2) and the following industrial parks:

1) Swan Island (SI)
2) Port Center (PC)
3) Rivergate (RG)
4) Cascade Station (CAS)
5) Portland International Center (PIC)
6) Airtrans Center (ATC)

Figure 2-1 illustrates the location of Port property covered by the MS4 Permit. It further delineates those properties leased to tenants and additionally covered by a Port or tenant-managed Industrial Stormwater Permit (i.e., a DEQ-issued 1200-Z or Individual NPDES Stormwater Permit). There were three new stormwater industrial permits issued in FY2023.

Because it is not acting as a typical city government, the Port is in a unique situation regarding permit compliance with regard to the more typical municipal planning, permitting, and land use modification processes. With the exception of the Port's stormwater design standards that are applied to Port-operated areas at PDX and T6, the City is responsible for these activities, and the Port complies with the City's process. For the purposes of this report, applicable reporting on these requirements contained in Schedule A.3.e (2021 MS4 Permit) are satisfied in the City's section of this annual report.

[1] The Port's undeveloped properties within the USB include wetland and grassland mitigation sites, natural areas, and vacant tax lots.

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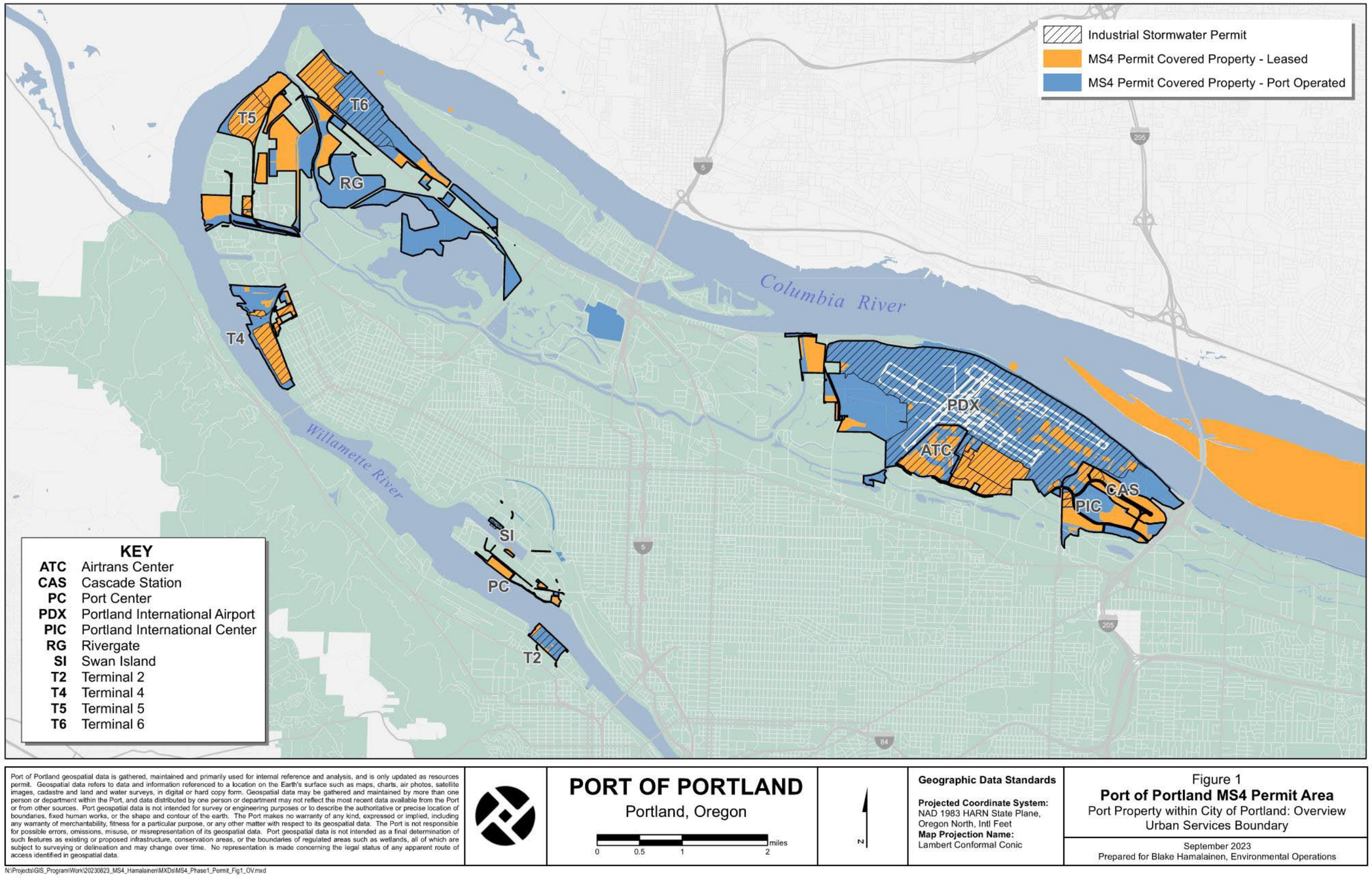

Figure 2-1. Port of Portland MS4 Permit Boundary Area

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PDX, the marine terminals, and the industrial parks are partially occupied by tenants. The Port manages those tenant properties through lease agreements. Leased property represents approximately 30% of Port property within the USB. A more detailed description of Port operating areas is included in Section 2.1.

Property owned by the Port is primarily zoned for commercial and industrial use. Many of these areas accommodate industrial activities that require DEQ-issued NPDES industrial stormwater general permits or individual permits addressing stormwater discharges. Within the USB, 54% of the Port's holdings are regulated under these permits. Portions of PDX, Terminal 2, Terminal 6, and the Navigation Base at Swan Island are operated by the Port under DEQ-issued industrial stormwater discharge permits. In addition, some tenants occupying leased property at PDX, Terminals 2, 4, 5, 6, and the industrial parks also operate under NPDES industrial stormwater permits. For Port operations within these areas, several of the MS4 Permit requirements are satisfied through implementation of industrial stormwater permit requirements as addressed in the facility's Stormwater Pollution Control Plans (SWPCPs). Section 2.2 addresses how these activities are coordinated with the Port's MS4 Permit responsibilities.

2.1 MS4 Permit Area

2.1.1 Aviation-PDX

PDX comprises an area of approximately 2,803 acres and is located in northeast Portland between the Columbia River and the Columbia Slough. The facility is owned and operated by the Port. However, numerous aviation-related tenants also conduct operations at PDX.

Stormwater runoff from PDX property discharges into the Columbia Slough through a series of pipes, open channels, and nine major outfalls. These stormwater discharges are permitted under the Individual PDX NPDES Waste and Stormwater Discharge Permit No. 101647 (Individual NPDES permit) issued and administered by DEQ. This Individual NPDES permit is structured to specifically address the Columbia Slough TMDL parameters, which include dissolved oxygen, pH, nutrients, bacteria, and toxics. Stormwater can also be pumped to the Columbia River through a de-icing treatment system. These discharges are also covered under the Port's Individual NPDES permit.

Currently, the Oregon Air National Guard and Yoshida Foods international have their own 1200-Z permits for their operations at PDX. Other PDX tenants whose operations trigger the need for a stormwater permit are co-permittees with the Port on the Port's Individual NPDES permit.

In addition to the Individual NPDES permit, PDX is also covered by an NPDES 1200-CA (Construction Discharge) Permit, a Water Pollution Control Facility (WPCF) 1700-B Wastewater Permit, and a Pretreatment permit issued by the City for discharges to the sanitary system. The pretreatment permit covers the following areas:

- Heating, ventilation, and air conditioning waste streams,
- Firefighting activities,
- Maintenance activities,
- Wash water generated by the Quick Turn-around Facility (a high-volume vehicle wash facility), and
- De-icing discharges.

2.1.2 Marine Facilities

The Port has three marine terminals (T4, T5, and T6) that are managed by the Port's Marine Business Line and one marine terminal managed by the Port's Industrial Development Business Line (T2). The terminals collectively occupy approximately 1,009 acres along the Willamette River (T2, T4,

and T5); the Columbia River, and the Columbia Slough (T6). These terminals handle the shipping, receiving, and temporary storage of finished goods, agricultural products, and raw materials.

Stormwater runoff from T6 discharges into the Columbia River and the Columbia Slough and is covered by 1200-Z permits held by both the Port and individual tenants. The Port obtained a 1200-Z permit for the Port-operated area of T6 in August of 2017. The Port continues to hold a 1200-Z permit for T2, a portion of which is leased to tenants. Multiple properties located at T4 and T5 are also leased to tenants, and several of these tenants hold their own 1200-Z or Individual NPDES permits that are issued by DEQ and administered by the City.

The Navigation facility is managed by the Port's Navigation Department and is located on Swan Island adjacent to the Willamette River. The facility is used to support dredging operations, including storage and maintenance of equipment used for dredging. Stormwater runoff from the Navigation facility discharges directly to the Willamette River or indirectly via a conveyance system consisting of catch basins and pipes to the City's MS4. The Navigation facility is covered by the 1200-Z permit, obtained in 2017. In addition, the marine terminals are covered by the Port's NPDES 1200-CA (Construction Discharge) permit.

2.1.3 Industrial Parks

As listed previously, the Port's Industrial Development Business Line manages six Port-owned industrial parks, Swan Island, Rivergate, Cascade Station, Portland Center, Airtrans Center, and the Portland International Center, totaling approximately 1,472 acres. Several industrial park tenants hold the 1200-Z or Individual NPDES permits issued by DEQ and administered by the City. In addition, the industrial parks are also covered by the Port's NPDES 1200-CA (Construction Discharge) Permit.

2.1.4 Undeveloped Properties

The Industrial Development Business Line also manages approximately 1,975 acres of undeveloped property within the City's USB. This does not include West Hayden Island, which is within the unincorporated USB and does not receive City services. Stormwater management activities for undeveloped properties discharging into the Port's MS4 are conducted under the MS4 Permit.

2.2 Summary of Port Permit Responsibility and Coordination with Co-Permittees

The Port's 2021 MS4 Permit (Schedule A.2) responsibility is influenced primarily by the following two factors:

First, the City is a co-permittee on the MS4 Permit. The City generally conducts MS4 Permit-related activities on a city-wide basis, with some activities overlapping with the Port's MS4 service area. As a result, the Port and City coordinate on meeting select MS4 Permit requirements through an Intergovernmental Agreement (IGA) to avoid duplication of effort. Specifically, planning and implementation of controls for new development, stormwater facility inspections, and stormwater monitoring are generally conducted by the City on behalf of the Port within the Port's MS4 service area. An exception would be related to the implementation of controls for new development where the Port applies its own Design Standards Manual at PDX and Terminal 6 Port-operated areas.

Second, the Port is unique in that its land use is primarily industrial, with no residential areas and with some large-scale parcels. As described in Section 2.1, some of the Port's operating areas (marine terminals, airport facilities, and/or industrial parks) are also regulated under 1200-Z or Individual NPDES permits and their associated SWPCPs. In addition, DEQ regulates stormwater discharges associated with the Port's capital improvement construction activities performed on Port property pursuant to the Port's 1200-CA permit.

Many requirements outlined in DEQ-issued 1200-Z and Individual NPDES permits, and the respective best management practices (BMPs) required pursuant to the associated SWPCPs, are similar to requirements outlined in Schedule A.3 of the 2021 MS4 Permit, specifically for activities related to operations and maintenance, certain illicit discharge elimination activities, spill response, and industrial monitoring. Therefore, operating areas with 1200-Z or Individual NPDES permits already meet many MS4 Permit requirements related to the above activities. In addition, some requirements in the Port's 1200-CA permit overlap with MS4 Permit requirements for erosion control.

Table 2-1 lists the 2021 MS4 Permit requirements and responsibilities and describes how each requirement is met by the 2022 SWMP. Responsibility descriptions for each MS4 Permit requirement are divided into two categories:

- Port MS4 Permit service areas that do not have 1200-Z or Individual NPDES permits, and
- Port MS4 Permit service areas where the Port, or its tenants, have 1200-Z or Individual NPDES permits.

Areas where the activity is covered by 1200-Z or Individual NPDES permits or through an IGA with the City are shaded gray in the table. The table was developed to clarify the complex relationship between the Port's management of stormwater BMPs within the City's USB, the City's overlapping stormwater management activities, and DEQ's regulation of stormwater on Port properties through industrial or construction NPDES permits.

Section 7 outlines the BMPs listed in the Port's 2022 SWMP and specifies responsible parties for each BMP implementation task. Section 7 also describes the Port's SWMP implementation during the permit year to address tracking measures and progress toward meeting measurable goals under each BMP.

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Table 2-1. Port of Portland 2021 MS4 Permit Requirements and Responsibilities[2]

MS4 Permit SWMP Requirements	MS4 Service Areas Not Covered Under NPDES 1200-Z or Individual Stormwater Permits		MS4 Service Areas Covered Under NPDES 1200-Z or Individual Stormwater Permits	
	Tenants	Port Operations	Tenants	Port Operations
Schedule A.3.a Public Education and Outreach				
i. Implement a documented public education and outreach program	PEO-1: Implement Public Education Measures to Protect Stormwater Quality			
ii. Provide educational material to the community or conduct equivalent outreach activities	PEO-1: Implement Public Education Measures to Protect Stormwater Quality PEO-2: Implement a Tenant Stormwater Education Program	N/A	PEO-1: Implement Public Education Measures to Protect Stormwater Quality PEO- 2: Implement a Tenant Stormwater Education Program	N/A
	PEO-1: Implement Public Education Measures to Protect Stormwater Quality			
iii. Identify target audiences and priority pollution reduction topics	PEO-1: Implement Public Education Measures to Protect Stormwater Quality			
Schedule A.3.b Public Involvement and Participation				
i. Publicly accessible SWMP website	PI-1: Implement SWMP Website Updates			
ii. Provide stewardship opportunities	PI-2: Implement a Public Participation Approach for SWMP Implementation			
iii. Describe public involvement programs, including metrics and tracking measures	PI-1: Implement SWMP Website Updates PI-2: Implement a Public Participation Approach for SWMP Implementation			
Schedule A.3.c Illicit Discharge Detection and Elimination				
i. Maintain maps showing major MS4 outfalls, conveyance system, structural stormwater controls, chronic illicit discharges, and priority dry-weather screening sites	ILL-2: Conduct Dry-Weather Field Screening			
ii. Prohibit through ordinance or other regulatory mechanism, illicit discharges	ILL-1: Implement IDDE Program			
iii. Describe and implement enforcement response procedures	ILL-1: Implement IDDE Program ILL-3: Implement Spill Response Program			
iv. Implement a program to detect and eliminate illicit discharges	ILL-1: Implement IDDE Program		Activities address employee reporting and are covered under 1200-Z or Individual NPDES permits. ILL-3: Implement Spill Response Program ILL-1: Implement IDDE Program	
v. Conduct annual dry-weather screenings	ILL-2: Conduct Dry-Weather Field Screening			
vi. Conduct IDDE trainings	TRN -1: MS4 Permit Training			
Schedule A.3.d Construction Site Runoff Control				
i. Ordinance and/or other regulatory mechanism that requires erosion and sediment controls	Covered by the City's erosion control ordinance and program; may also be covered under DEQ's 1200-C Construction Stormwater General Permit program	Covered by the Port's DEQ issued 1200-CA Permit and the City's erosion control program and related contract specifications	Covered by the City's erosion control ordinance and program; may also be covered under DEQ's 1200-C permit program	Covered by the Port's DEQ issued 1200-CA Permit and the City's erosion control program and related contract specifications
ii. Require construction site operators to develop site plans and implement erosion and sediment control BMPs				
iii. Require review of erosion and sediment control plans				
iv. Conduct construction site inspections				
v. Implement and maintain enforcement response procedures				
vi. Construction runoff control training and education				
Schedule A.3.e Post-Construction Site Runoff for New Development and Redevelopment				
i. Adopt an ordinance that applies to sites that create or replace 1,000 SF of impervious surface	Covered by the City's SWMM and associated implementation program and ordinance with the exception of PDX, Terminal 6, and designated properties around the airfield which are covered by PC-1: Port-Specific Post-Construction Site Runoff Controls, and associated training in TRN-1			
ii. Prioritize the use of Low Impact Development and Green Infrastructure				
iii. Develop and implement an enforceable post-construction SWMM to include prioritizing onsite retention				
iv. Develop a water quality benefit offset program				

[2] This table has been updated in the Port's 2022 SWMP and is now reflected in this FY2023 Annual Report. DEQ approved the 2022 SWMP in December 2022 and updated it in FY2023 (posted on the Port's SWMP Document Library).

Table 2-1. Port of Portland 2021 MS4 Permit Requirements and Responsibilities[2]

MS4 Permit SWMP Requirements	MS4 Service Areas Not Covered Under NPDES 1200-Z or Individual Stormwater Permits		MS4 Service Areas Covered Under NPDES 1200-Z or Individual Stormwater Permits	
	Tenants	Port Operations	Tenants	Port Operations
v. Standardized procedure for the review and approval of structural stormwater control plans for new development and redevelopment projects				
vi. Implement a strategy to ensure that all public and private stormwater controls discharging to the MS4 are operated and maintained to the Maximum Extent Practicable				
vii. Post-construction training of staff responsible for performing post-construction site plan reviews, administering the post-construction program requirements, and performing/evaluating O&M practices				
Schedule A.3.f Pollution Prevention and Good Housekeeping for Municipal Operations				
i. Develop and implement an O&M strategy for both co-permittee-owned controls and controls owned and operated by other non-MS4 and non-NPDES entities discharging to the MS4	See A.3.e.vi–Long Term Operation and Maintenance			
ii. Implement a program to inspect, maintain, and clean MS4 and related structures	OM-1: Stormwater System Cleaning and Maintenance			
iii. Conduct O&M activities	OM-1: Stormwater System Cleaning and Maintenance OM-2: Minimize Water Quality Impacts Associated with Landscape Management Practices OM-3: Coordinate with the Local Fire Department to Minimize Pollutant Discharge from Firefighting Training Activities			
iv. Maintain coverage for applicable facilities under DEQ's NPDES Industrial Stormwater General Permit	Covered under NPDES industrial stormwater permits.			
v. Implement a winter O&M program	OM-5: Winter Weather Management [3]			
vi. Implement a program to control the use and application of pesticides and fertilizers	OM-2: Minimize Water Quality Impacts Associated with Landscape Management Practices			
vii. Implement a litter control program	OM-6: Litter Control			
viii. Material disposal program	OM-1: Stormwater System Cleaning and Maintenance			
ix. Address water quality in flood control, transportation, and other infrastructure planning	The City conducts planning for public flood control, transportation, and other infrastructure except for at PDX. PDX has its own master plan that addresses water quality.			
x. Training on pollution prevention during O&M activities	TRN-1: MS4 Permit Training			
Schedule A.3.g Industrial and Commercial Facilities				
i. Screen existing and new industrial stormwater permitting	The City conducts screening for existing and new facilities to assess NPDES permitting needs		The City conducts screening of existing and new facilities to assess NPDES permitting needs IND-1: Screen Existing and New Industrial and Commercial Facilities at PDX	
ii. Reduce pollutants from industrial and commercial facilities	IND-1: Screen Existing and New Industrial Facilities IND-2: Address High Pollutant Source Facilities		These areas are already covered by an industrial stormwater NPDES permit	
iii. Train staff on evaluating industrial and commercial trainings	TRN-1: MS4 Permit Training			
Schedule A.3.h Infrastructure Retrofit and Hydromodification Assessment Update				
i. Complete hydromodification assessment	RET-1: Infrastructure Retrofits			

Note: Rows that have a grey background indicate that the activity is covered by 1200-Z or Individual NPDES permits or through an IGA with the City

DEQ = Oregon Department of Environmental Quality; IDDE = Illicit Discharge Detection and Elimination; MS4 = Municipal Separate Storm Sewer System; O&M = operations and maintenance; NPDES = National Pollutant Discharge Elimination System; PDX = Portland International Airport; SWMM = Stormwater Management Manual; SWMP = Stormwater Management Plan.

[3] OM-4: GIS System and Asset Management Database is a BMP that is implemented to meet tracking measure requirements and is not covered in this table. See Section 7.1.6.

Section 3: Port of Portland Organizational Structure

The Port's Environmental Operations Department is responsible for administering the MS4 Permit and the SWMP. The Environmental Land and Water Manager serves as the MS4 Permit manager.

Environmental Operations is the lead group responsible for planning, tracking, and overall implementation of the Port's SWMP. The following departments/groups also participate in stormwater program implementation:

- Aircraft Rescue Fire Fighting
- Engineering
- Construction Services
- Marine Facilities Maintenance (MFM)
- PDX Maintenance (MX)
- Properties

As a means of coordinating Port-wide programs and policies, environmental program managers regularly meet with cross-functional teams that include Port operating area staff.

One means of coordination between Port staff is through internal teams such as the Stormwater Asset Management Team and the Water Resources Program Team. These teams include staff from Environmental, Aviation and Marine Operations, Asset Management, Planning, Public Affairs, and Engineering. Teams meet periodically and are responsible for providing input on Port-wide projects, policies, water quality issues, and permit implementation. The MS4 Permit Manager is a key team member and actively participates.

With respect to implementation of the Port's industrial stormwater discharge permits, Environmental Operations staff prepares, updates, and ensures implementation of SWPCPs in coordination with co-permittees and non-Port operators where applicable. Tenants with industrial stormwater discharge permits are also required to prepare, maintain, and implement SWPCPs. The City (DEQ's agent for administering industrial permits) coordinates directly with Port tenants holding these permits.

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Section 4: Stormwater Expenditures

The Port's state-mandated mission is to enhance the region's economy and quality of life by providing efficient cargo and air passenger access to global and national markets. In support of this mission, the Port annually undertakes budget and business planning to identify areas of focus and required actions.

Port revenue is primarily derived from business transactions with the users and tenants of Port facilities. A small proportion (approximately 3 to 4 percent) of the Port's overall revenue is from property taxes. Business transactions generally occur between the Marine Business Line, Aviation Business Line (Commercial Aviation and General Aviation), Industrial Development Business Line, and associated users and tenants of those properties. Industrial Development Business Line revenue source also includes the sale of property. The Port is reimbursed by the U.S. Army Corps of Engineers for costs incurred providing dredging services.

Commercial Aviation (PDX) funds are derived primarily from fees related to passenger and cargo airline operators, airport parking, rental car revenue, passenger facility charges, federal grants, and other tenant fees. PDX revenue cannot be comingled with other operating area revenue and is restricted for use at aviation facilities only by bond ordinances and Federal Aviation Administration (FAA) regulations.

The Port annually budgets resources to fund projects and programs identified in the Strategic and Business Line Plans and capital improvement projects identified in stormwater master plans. Program expenses are allocated among Business Lines and departments involved in implementation of the program. Specifically, stormwater resources are allocated across the following business lines: Information Technology, Legal, Engineering, Marine and Industrial Development, and Aviation. Stormwater program expenditures include the cost of staff salary (including fringe costs), permit fees, contractor and consultant fees, stormwater infrastructure, City of Portland stormwater fees, disposal of collected material, sample analysis, stormwater training, and outreach materials.

The estimated and projected stormwater program expenditures are broken out by area and presented in Table 2-2.

Table 2-2. Summary of Port Stormwater Expenditures

Business Line	2022-23 Stormwater Expenditures	Projected 2023-2024 Stormwater Expenditures
Marine and Industrial Development	$1,944,035	$ 2,002,356
Deicing Subtotal	$2,524,270	--
Aviation Subtotal (without Deicing)	$1,831,171	--
Aviation Subtotal (with Deicing)	--	$4,486,104
Engineering	$67,531	$3,069557
Information Technology	$4,280	$4,408
Legal	$11,950	$ 12,309
Total	$6,383,237	$9,574,734

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Section 5: Demonstration of Continued Legal Authority to Implement the Programs Outlined in the SWMP

The Port has authority to implement programs outlined in the SWMP through ordinance, permits, and contracts.

The Port has statutory authority to enact ordinances to regulate stormwater sewers that it owns, operates, maintains, or controls. On March 11, 1992, the Port Commission adopted Ordinance No. 361, which provided the Port with legal authority over specific activities conducted by persons occupying land owned by the Port (e.g., tenants, vendors, contractors). Section 4 of Ordinance 361 requires written permission from the Port before connecting to a Port storm sewer.

Section 5 of Ordinance 361 authorizes the Port to perform the following activities:

- Inspect the land and storm sewers for violations of the ordinance or applicable law that governs the conveyance or disposal of stormwater.
- Control the contribution of pollutants to storm sewers owned or operated by the Port.
- Control the quality of stormwater discharged from the sites of industrial activity on land owned by the Port.
- Control the discharge to storm sewers owned or operated by the Port of pollutants from spills, dumping, or the disposal of materials other than stormwater.

In addition, in Ordinance 361 and the Portland International Airport Rules, the Port has legal authority to control the contribution of pollutants to the municipal storm sewer through contracts with its tenants. The lease agreements require the lessee to comply with the Port's MS4 Permit. Some properties also have industrial stormwater permits, and lease agreements also include requirements to comply with these permit conditions. Through these regulatory and contractual mechanisms, the Port is working with tenants and users of Port facilities to implement and evaluate BMPs that control the contribution of pollutants to the Port's MS4.

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Section 6: Stormwater Monitoring

The Port's monitoring program consists of both environmental and BMP monitoring elements. These monitoring elements are conducted for the purposes of addressing the following monitoring objectives:

1. Evaluate the source(s) of and means for reducing the pollutants of concern applicable to the Port's permit area, including 2018/2020 303(d) listed pollutants, as applicable;
2. Evaluate the effectiveness of BMPs to help determine BMP implementation priorities;
3. Characterize stormwater based on land use type, seasonality, geography, or other catchment characteristics;
4. Evaluate status and long-term trends in receiving waters associated with MS4 stormwater discharges;
5. Assess the chemical, biological, and physical effects of MS4 stormwater discharges on receiving waters; and
6. Assess progress toward reducing TMDL pollutant loads.

A description of each monitoring program element is provided below.

6.1 Environmental Monitoring

The Port satisfies the MS4 environmental monitoring requirements through an IGA with the City of Portland. The IGA specifies the terms and conditions of how the Port shares costs with the City for environmental monitoring efforts. The data summarized in this annual report was collected according to the City's 2022 Monitoring Plan, which consists of in-stream, in-stream (continuous), stormwater, and macroinvertebrate monitoring elements. A discussion of this program and its operations during FY2023 is included in the City of Portland's Monitoring Compliance Report (Section IV of the City's Annual Report). The joint 2022 Monitoring Plan was updated for implementation in FY2022. This joint Monitoring Plan was submitted to DEQ with the annual report on November 1, 2022, and was approved on December 16, 2022.

6.2 BMP Monitoring

The Port's BMP monitoring activities are described as tracking measures and measurable goals in the most recently approved SWMP, submitted to DEQ on November 1, 2022. These monitoring activities are specific indicator metrics that help document the completion of tasks and assess the relative effectiveness of BMPs. The implementation tasks, tracking measures, and measurable goals associated with each Port BMP are provided in Sections 7.1.1 through 7.1.9.

6.3 Additional Stormwater Monitoring Activities

The Port collects and submits additional stormwater monitoring data to DEQ as required by the Port's various NPDES stormwater permits. Data collected for these permits is not included in the MS4 Permit annual report. However, this data is available upon request.

This monitoring provides data about stormwater discharges from Port industrial properties. Information resulting from these sampling events has been used to manage the stormwater programs at these facilities and may continue to be useful for understanding water quality impacts from different types of industrial sources.

The Port submitted stormwater monitoring data to DEQ for the following industrial stormwater discharge permits in FY2023:

- NPDES 1200-Z Industrial Stormwater Discharge Permit, DEQ File No. 114024 (Terminal 2)
- NPDES 1200-Z Industrial Stormwater Discharge Permit, DEQ File No. 125313 (Terminal 6)
- NPDES 1200-Z Industrial Stormwater Discharge Permit, DEQ File No. 125569 (Navigation Base)
- NPDES Individual Deicing and Stormwater Discharge Permit No. 101647 (PDX)

Section 7: Accomplishments For Permit Year Twenty-Eight (2022–2023)

7.1 SWMP Implementation

The annual report content and format in this section are based on the SWMP submitted to DEQ on November 1, 2022, and updated in FY2023. The SWMP is structured into nine major elements. These elements contain the necessary BMPs to address 2021 MS4 Permit requirements included in Schedule A (3) (a-h), including the Port's MS4 Training Strategy provided in Element #9 (Section 7.1.9). Reporting for each BMP, including implementation tasks, tracking measures, and measurable goals, is provided in the following subsections.

7.1.1 Element #1: Education and Outreach

PEO-1: Implement Public Education Measures to Protect Stormwater Quality

BMP Description:

- The Port implements a public education strategy and conducts a variety of outreach activities to educate the public and employees on the protection of stormwater quality. The Port's primary target audience for public outreach is the industrial and commercial tenants. Such educational activities include participation in media campaigns.
- The Port's cooperative public education efforts with other groups or agencies include the Columbia Slough Watershed Council (CSWC) and Oregon Environmental Council. Port staff serve on the CSWC board and currently provide an annual monetary sponsorship.

Implementation Tasks:

1. Continue participation in the KPTV Public Outreach Campaign (July–June)
2. Continue to include stormwater education materials at Port-sponsored outreach events and post on the Port's SWMP website to reach the target audience.
3. Provide the target audience with education materials on priority topics to address: 1) proper disposal of waste materials, 2) proper application of fertilizer and pesticides, and 3) reducing spills into waterways.
4. Continue to attach the "Dump No Waste, Drains to Stream" decals to catch basins associated with all new Port construction annually at PDX. Continue to paint this message at marine terminal stormwater inlets. Expand this program to all Port properties during the Permit term. This program helps address the interconnection between catch basins/storm drains and local creeks/surface waters.
5. During inspections conducted under the BMPs "Implement Inspections of Significant Pollutant Source Areas" and "Implement a Stormwater System Cleaning and Maintenance Program," identify catch basins where it would be relevant and appropriate to apply "Dump No Waste, Drains to Stream" decals and apply decals.

Tracking Measures:

1. Track events where stormwater educational materials were made available.
   - In FY2023, the Port's cooperative efforts with other groups or agencies included the CSWC and the Oregon Environmental Council. Port staff serve on the board of the CSWC and currently provide an annual monetary sponsorship. Port staff also participated in a middle school career day at a local school.
2. Track participation in the KPTV Annual Campaign.
   - In FY 2023, the Port of Portland participated in the KPTV Annual Campaign.[4] The premise of the campaign is to educate and engage viewers with helpful water conservation and healthy water tips. The campaign has many elements, including promos produced by KPTV and fronted by KPTV's chief meteorologist.
3. Track the Decal Program.
   - The Port applied approximately 20 new decals in FY2023.

Measurable Goals:

1. Provide stormwater education materials at outreach events.
   - Completed in FY2023, see the tracking measures above.
2. Provide target audiences with education materials.
   - Completed in FY2023, see the tracking measures above.
3. Post stormwater education materials on the Port's SWMP website.
   - In FY2023, the Port of Portland posted stormwater education materials on the Port's SWMP website.[5]
4. Participate in the KPTV Annual Campaign.
   - The Port of Portland participated in the KPTV Clean Waters Campaign in FY2023. The premise of the campaign is to educate and engage viewers with helpful water conservation and healthy water tips. The campaign has many elements including promo's produced by KPTV and fronted by KPTV's chief meteorologist.
5. Continue the "Dump No Waste, Drains to Stream" Decal Program
   - Applied decals in FY2023, see the tracking measures above .

PEO-2: Implement a Tenant Stormwater Education Program

BMP Description:

- The Port's primary target audience is industrial and commercial tenants. Outreach efforts directed to industrial and commercial tenants' results in the reduction of pollutant discharges from municipal separate storm sewers.
- Port staff will provide a variety of stormwater education and outreach materials to tenants as needed and include stormwater rules, regulations, and other educational material in tenant leases (Section 7.0 of the Airport Facility Lease document addresses Environmental Management). Such educational materials may include educational information on pesticide, herbicide, and fertilizer management and information related to appropriate spill response procedures.

Implementation Tasks:

1. Maintain an inventory of all active tenants or lease holders.

[4] https://www.kptv.com/page/clean-water-its-our-future/.

[5] Port of Portland - Environmental - Stormwater Management.

- Marine, Aviation, and Industrial Development Properties groups provide an updated list of leaseholders annually. Tenant information is also updated on its own GIS layer within PortGIS, through a separate process. However, many of these leaseholds do not have any significant exposure to stormwater. Operating area environmental staff are familiar with the circumstances and needs of specific leaseholders. This information is taken into consideration when selecting priority facilities for inspection.

2. Provide stormwater educational materials in new tenant leases.
    - The Port has developed stormwater BMP education and outreach materials targeting industrial properties. In FY2023, these were used in conjunction with the industrial inspection program and distributed to a larger group of industrial/commercial entities within the Port's jurisdiction.
    - The Port provides stormwater language in new leases, and we tailor it for each tenant considering their operations. The Port also provide stormwater materials during our ICF inspections, as needed.

Tracking Measures:

1. Verify the completion and/or update of a leasehold inventory.
    - Completed in FY2023, see the tracking measures above.
2. Track stormwater education materials provided to tenants.
    - In FY2023, the Port provided technical assistance on all stormwater issues encountered during priority facility inspections.

Measurable Goals:

1. Compile/update a leasehold inventory annually that includes stormwater educational materials.
    - Completed in FY2023, see the tracking measures above.
2. Provide stormwater education materials related to structural and non-structural/source control BMPs to tenants in new leases over the permit term.
    - Completed in FY2023, see the tracking measures above.

7.1.2 Element #2: Public Involvement and Participation

PI-1: Implement SWMP Website Updates

BMP Description:

– Maintain and promote a publicly accessible website containing information on the SWMP Document and implementation and educational materials.

Implementation Tasks:

1. Post a reporting mechanism for public complaints or reports of illicit discharges.
2. Include links to final reports, plans, and other documents relevant to the MS4 programs, as well as drafts of documents requiring public comment.
3. Provide links to ordinances, policies, and/or guidance documents related to construction and commercial/industrial stormwater management control programs.
4. List contact information for relevant staff, including a phone number, mailing address, and email address.

Tracking Measures:

1. Document SWMP website updates in the annual report.

- The Port's Environmental Land and Water Manager updates and maintains the Port's existing SWMP website, which includes a SWMP Document Library. The library includes documents referenced in the 2022 SWMP.

Measurable Goals:

1. Update and maintain the Port's existing SWMP website.
   - Completed in FY2023, see the tracking measures above.

PI-2: Implement a Public Participation Approach for SWMP Implementation

BMP Description:

– Identify appropriate stewardship opportunities for the public to be involved in related to implementation of the Port's MS4 program, and implement these projects over the permit term.

Implementation Tasks:

1. Determine what projects are appropriate for public involvement.
2. Make the public aware of the selected involvement opportunities via the Port's website and the CWSC.
3. Implement selected projects, and document public involvement.
4. Continue to participate in local school career days.

Tracking Measures:

1. Describe any projects implemented where the public has the opportunity to participate and the extent of public involvement for each.
   - The following FY2023 events provided the opportunity for the public to participate in implementation of the Port's stormwater program:
     – The Port of Portland participated in the KPTV Clean Waters Campaign in FY2023. The public has the opportunity to participate in the campaign to the extent that they desire. The Port has a community engagement website on the Port's public website[6].
     – Port staff visited a middle school to engage the public on the Port's SWMP.

Measurable Goals:

1. Document what projects and events are identified as public involvement opportunities, including the Port's stewardship opportunities.
   - The following have been identified as a possibility for next year:
     – The Port will continue to sponsor events that connect the public to stormwater and participate with organizations whose mission is to enhance water quality through public outreach.

7.1.3 Element #3: Illicit Discharge Detection and Elimination

ILL-1: Implement the Illicit Discharge Detection and Elimination (IDDE) Program

BMP Description:

- Through Ordinance 361, the Port has the authority to eliminate illicit discharges throughout its property including those associated with tenants on Port property.

[6] The Port's community engagement site is on the Port's public website https://portofportland.com/Community, In addition, the public can send comments to enviroideas@portofportland.com which is listed on the Port's environmental page.

- Environmental Operations staff implements and enforces documented IDDE procedures.

Implementation Tasks:

1. Implement the Port's updated "Work Instruction: IDDE Program" with new response timelines (Responsibility: Environmental Operations).
2. Continue to enforce Ordinance 361 to prohibit non-stormwater discharges into the MS4 (Responsibility: Environmental Operations).
3. Implement a reporting program for potential illicit discharges by maintaining spill notification signs throughout Port property. Continue to implement documented IDDE procedures. Environmental Operations and Marine Environment staff implement an updated document for IDDE procedures. (Responsibility: Environmental Operations)
   - See Element #9 (Section 7.1.9) for required training.

Tracking Measures:

1. Track the status of any updates to the IDDE procedures.
   - Completed in FY2023. See the tracking measure above.
2. Track the number, type, location, and resolution of any illicit discharge investigations conducted.
   - Aviation did not have any reportable illicit discharges in FY2023 (see summary under ILL-2: Conduct Annual Dry-Weather Field Screening tracking measures).
   - Marine did not have any reportable illicit discharges in FY2023 (see summary under ILL-2: Conduct Annual Dry-Weather Field Screening tracking measures).
   - Industrial did not have any reportable illicit discharges in FY2023 (see summary under ILL-2: Conduct Annual Dry-Weather Field Screening tracking measures).
   - The Port has an IDDE reporting page on its public website: https://portofportland.com/Environment/ReportSpillDischargeForm

Measurable Goals:

1. Continue IDDE program implementation and enforcement.
   - Implementation schedule: Ongoing

ILL-2: Conduct Annual Dry-Weather Field Screening

BMP Description:

- The Port conducts annual field screening activities during dry-weather conditions (between July and September) at all Port-owned priority outfall locations. Activities are conducted according to documented procedures. If necessary, in accordance with dry-weather field screening activities, the Port updates its GIS files annually related to existing outfall and priority outfall locations.

Implementation Tasks:

1. Update and maintain an MS4 map of outfall locations, conveyance system, stormwater controls, chronic illicit discharges, and dry-weather priority screening sites. Annually, as necessary, update Port data files related to outfall locations in accordance with dry-weather field screening activities.
2. Review and update dry-weather screening prioritization criteria and include results in the review of the third-year annual report. If necessary, update the SWMP document to reflect new criteria and procedures.
3. Conduct annual dry-weather field screening activities at all priority outfall locations within 72 hours of an antecedent dry period. In general, these activities include the following:

- Document general observations of flow, turbidity, oil sheen, trash, debris or scrum, condition, color, odor, and other relevant observations of any non-stormwater or illicit discharges.
- Field screening and analysis if flow is observed.
- Utilize pollutant parameter action levels as part of field screening.
- If the source cannot be identified, collect water quality samples and conduct laboratory analysis for ongoing discharges.
- See Element #9 for required training.

Tracking Measures:

1. Track the number and location of priority outfalls inspected during dry-weather field screening activities.
   - In FY 2023, 16 Aviation outfalls were inspected.
   - In FY 2023, 50 Marine & Industrial outfalls were inspected.
   - The location of Port priority outfalls for dry-weather field screening is mapped in the Port's GIS system.
2. Summarize dry-weather field screening inspection results and indicate outfalls requiring sampling or follow-up activities.
   - Aviation screening was conducted in FY2023.
     - **Summary:** Sixteen outfalls were inspected; no visible illicit discharges were observed.
   - Marine & Industrial screening was conducted in FY2023.
     - **Summary:** Fifty Port outfalls were inspected; no visible illicit discharges were observed.
3. Indicate the outcome and resolution of inspection activities conducted.
   - No illicit discharges were observed.

Measurable Goals:

1. Maintain the MS4 map.
   - The Port maintains maps of its MS4 system. The Port continually updates its GIS data and at least annually updates MS4 maps. The MS4 maps were most recently updated in October 2023.
2. Review and update dry-weather screening criteria.
   - In FY2023, the Port reviewed and updated its IDDE Work Instructions that include dry-weather field screening criteria and updated response timelines. The updated IDDE Work Instructions are available on the Port's website in the SWMP Document Library.
3. Inspect priority outfalls annually and follow dry-weather field screening procedures.
   - In FY2023, Port Environmental Operations completed dry-weather field screening inspections at 66 priority marine, industrial and aviation outfalls. Inspections were completed following the Port's IDDE Work Instructions.

ILL-3: Implement the Spill Response Program

BMP Description:

- Facilities subject to the Spill Prevention Control and Countermeasures Act (SPCC) and/or the industrial stormwater permit program include site specific spill response

plans in the facility's SPCC and/or SWPCP plan. Site specific spill response plans for these facilities can be accessed on the Port's public website. [7]

- The Port also implements a Spill Response Program for all Port properties in accordance with provisions outlined in the Port's Spill Response Procedures. Spills are reported to the PDX Communication Center, which notifies on-call Port Environmental staff, who in turn coordinate response and ensure proper cleanup. Port Environmental staff dispatch an on-call emergency response contractors as needed. Port Environmental staff also completes the necessary reporting requirements, including notification of the Oregon Emergency Response System and the National Response Center, when appropriate. Spills occurring at marine terminals are first reported to Marine Security, which then notifies the PDX Communication Center.

Implementation Tasks:

1. Continue to implement the Port's spill response procedures and update, as necessary.
2. Continue to implement a reporting program for potential illicit discharges by maintaining spill notification signs throughout Port property and an online reporting mechanism.

Tracking Measures:

1. Track the number of spill complaints received.
   - No spill complaints were received in FY2023.
2. Track the number, location, and type of spills of a reportable quantity for which a spill response was conducted.
   - No spills of a reportable quantity were responded to in FY2023.

Measurable Goals:

1. Implement the Port's Spill response procedures.
   - In FY2023, the Port actively implemented the Spill Response Program for all Port properties in accordance with provisions outlined in the Port's Spill Response Procedures.

7.1.4 Element #4: Construction Site Runoff Control

The goals of construction site runoff control program are to prevent sediment and other construction related materials from leaving construction sites through the implementation of properly selected and installed BMPs, education on erosion prevention and sediment control principals, site inspections, and enforcement.

The City of Portland's erosion control program, as outlined in its Erosion Control Manual, is applied city-wide and also applies to areas within the Port's MS4 Permit jurisdiction. At a minimum, all construction sites with ground-disturbing activities are required to comply with the City's Title 10 Erosion and Sediment Control Regulations. Construction sites with qualifying ground-disturbing activities are required to obtain a City-issued Site Development Permit, which includes specific erosion control BMP requirements. Additionally, construction sites disturbing 1 acre, or more are required to obtain a 1200-C general permit from DEQ. As an agent of DEQ, the City administers the 1200-C permit for projects occurring within its MS4 Permit jurisdiction.

Port capital improvement construction projects that disturb 1 acre or more are covered by the Port's 1200-CA permit, issued and administered by DEQ. The Port incorporates both City and 1200-CA permit erosion control BMPs, as appropriate, into project specifications and contracts to ensure compliance.

7 Current SPCC and SWPCP plans can be downloaded from here: https://portofportland.com/Environment/StormwaterManagement

7.1.5 Element #5: Post-Construction Site Runoff Control

PC-1: Port-Specific Post-Construction Runoff Controls

BMP Description:

- For select areas of PDX and T6, development/redevelopment projects address the MS4 Permit post-construction requirements through implementation of the Port's Stormwater Design Standards Manual (DSM), dated 2017.
- The City of Portland's Stormwater Management Manual for post-construction development standards is applied to all other Port property within the Port's MS4 permit boundary.

Implementation Tasks:

1. Implement the DSM for development and redevelopment in areas where the DSM applies. Airport-specific standards will be consistent with FAA and airport operations requirements.
2. Conduct a gap analysis review and update the DSM to ensure compliance with the MS4 Permit, including a review of the LID strategy.

Tracking Measures:

1. Track IGA adoption.
   - The Port's IGA with the City of Portland has been adopted.
2. Track the number of development applications reviewed and approved for compliance with stormwater regulations.
   - In FY2023, the Port reviewed and approved 41 development applications for compliance with stormwater regulations.
3. Track the number, type, and drainage area of stormwater facilities installed to address post-construction requirements.
   - In FY2023,[8] no new stormwater facilities were installed to address post-construction requirements.

Measurable Goals:

1. Continue to implement the Port's post-construction development/redevelopment standards in areas where they apply.
   - The Port implements the DSM for select areas of PDX and T6 development/redevelopment projects.
2. Conduct a gap analysis of the DSM and update the DSM as needed.
   - The Port conducted a post-construction requirements gap analysis of the DSM in FY2023. Updates to the DSM will be finalized by December 1, 2024.

7.1.6 Element #6: Pollution Prevention and Good Housekeeping for Municipal Operations

OM-1: Stormwater System Cleaning and Maintenance

BMP Description:

[8] There are currently 266 stormwater treatment facilities operating on Port property. No new stormwater treatment facilities were constructed in FY2023. The Port is currently working to develop a stormwater treatment facility tool in GIS to help locate and quantify impervious area treated.

- The Port has a program for inspecting, maintaining, and cleaning the MS4 and related structures every 5 years. The Port maintains records of the inspection and cleaning activities.

Implementation Tasks:

1. The Port inspects and cleans all catch basins (as necessary) annually in Port-managed Marine Business Line areas.
2. The Port maintains its stormwater system through a program that features inspections and maintenance.
3. Marine-operated water quality treatment facilities are inspected at least on a quarterly basis and cleaned as needed to maintain proper operation.
4. Aviation-owned water quality treatment facilities (except for quiescent and detention ponds) are cleaned on an annual basis. The ponds are cleaned on a 3-year rotating basis.
5. The Port tracks all inspection and cleaning activities, including the total number of catch basins cleaned, tons of waste removed from catch basins, water quality facilities inspected and maintained, and linear feet of pipe cleaned.
6. The Port sweeps Port-managed areas of the Marine terminals annually at a minimum and more frequently as needed.
7. The Port sweeps landside roadways and parking areas within Port-owned property adjacent to PDX twice weekly at a minimum and more frequently as needed.
8. The Port sweeps the PDX maintenance facility and select areas of the PDX airfield daily.
9. The Port decants material collected from sweeping and storm system cleaning in water-tight drop boxes (Decant Water Collection Boxes) that drain to an approved sanitary sewer discharge point.

Tracking Measures:

1. Track sweeping frequency at the Marine terminals.
   - Sweeping was conducted periodically throughout the year at Terminal 2, Terminal 4 and Terminal 6.
   - The Port performed 306.5 hours of sweeping at marine terminals.
2. Track sweeping frequency at Airport Way, Frontage Road, and the PDX employee parking lots.
   - PDX Maintenance performs regular sweeping for these areas.
   - PDX Maintenance also performs routine sweeping of the maintenance facility and the airfield.
   - The PDX Maintenance staff performed approximately 3,612.75 hours of sweeping.
3. Report the amount of materials removed from catch basins. Materials include those collected from catch basins and other structural devices.
   - 34.87 tons of material were removed from catch basins and impervious surfaces (sweeping) at Marine facilities.
   - 313.66 tons of material were removed from catch basins and impervious surfaces (sweeping) at Aviation facilities.

Measurable Goals:

1. Inspect catch basins in the Port-managed Marine Business Line areas.
   - Catch basins were inspected at the Marine Business Line areas in FY2023, see the tracking measures above.
2. Maintain Marine- and Aviation-operated water quality treatment facilities.

- The Port maintained Marine- and Aviation-operated water quality treatment facilities in FY2023.

3. Sweep Port-managed, accessible areas of the Marine terminals annually.
   - Sweeping was conducted in FY2023 at Marine terminals. See the tracking measures above.
4. Sweep Airport Way, Frontage Road, and the PDX employee parking lots a minimum of once per week.
   - Sweeping of Airport Way, Frontage Road, and the PDX employee parking lots was conducted at least once a week in FY2023. See the tracking measures above.
5. Sweep the PDX maintenance facility and PDX airfield routinely.
   - Street sweeping of the maintenance facility and airfield were conducted routinely. See the tracking measures above.

OM-2: Minimize Water Quality Impacts Associated with Landscape Maintenance Practices

BMP Description:

- The Port has a program to control the use and application of pesticides, herbicides, and fertilizers on Port property. This program includes guidance for marine, industrial, aviation and undeveloped properties. As necessary, the program will be updated to meet permit requirements.

Implementation Tasks:

1. Apply pesticides and fertilizers using an integrated pest management (IPM) approach to minimize impacts to stormwater (Responsibility: Industrial and undeveloped Properties Maintenance, MX, MFM).
2. Review the Port's program to control pesticides, herbicides, and fertilizers annually and update as appropriate.
3. Maintain an inventory of pesticides used on Port property and update annually.

Tracking Measures:

1. Track annual pesticide use.
   - The amounts of each pesticide/herbicide /fertilizer used in FY2023 are presented below in Tables 6-1 to 6-6.

Measurable Goals:

1. Annually update the Port's pesticide use inventory.
   - Completed for FY2023, see Table 6-1.

Table 6-1. Herbicide Use from July 1, 2022, to June 30, 2023 (FY2023)

Trade Name	Amount Used
Aquaneat	302 ounces
Select Max	272 ounces
Transline	37 ounces
Vaquero	41 ounces
Vastlan	879 ounces

Table 6-2. MFM Pesticides/Herbicides/Fertilizer from July 1, 2022, to June 30, 2023	
Trade Name	Amount Used
Agri Star Triclopyr (3A and Garlon alternative)	53.39 gallons
Ranger Pro, herbicide	65.64 gallons
Right on Blue	38.62 gallons
SPRAY-007 surfactant/penetrant	8.04 gallons
Spyder herbicide	1.54 gallons

Table 6-3. PDX General Maintenance Pesticide Use from July 1, 2022, to June 30, 2023	
Trade Name	Amount Used
Sureguard	696 ounces
Crossroads	357 gallons
Ranger Pro	29 gallons
ZP	143,530 pounds
Acelepyrn	6,050 pounds

Table 6-4. PDX Landscape Maintenance Herbicide Use from July 1, 2022, to June 30, 2023	
Trade Name	Amount Used
Atrimmec GR	5 gallons
Casaron 4G	50 pounds
Gallery 75 DF pre-m	60 pounds
Pendulum AquaCap	23 gallons
Q4 Turf Herbicide	8 gallons
Ranger Pro	16 gallons
Simazine 4L	10 gallons
Snapshot 25Tg	50 pounds
Tower herbicide	10 gallons
Triclopyr 3A	11 gallons
Vexis	42 pounds

Table 6-5. Marine Landscape Maintenance Herbicide Use from July 1, 2022, to June 30, 2023	
Trade Name	Amount Used
Ranger Pro	1,503 ounces
Triclophry 3A Herbicide	2,353.25 ounces
Gly-Star Plus	1751 ounces

OM-3: Coordinate with the Local Fire Department to Minimize Pollutant Discharge from Firefighting Training Activities

BMP Description:

- PDX and the Oregon Air National Guard have their own fire departments. No other fire districts train on Port property. PDX has a designated fire training facility equipped with

an oil/water separator and holding tanks. All water used for live-fire training is captured and reused for future training exercises, allowed to evaporate, or disposed off-site. Firefighting foam is not used for training purposes The Air National Guard conducts training operations in accordance with their DEQ-issued NPDES permit.

Implementation Tasks:

1. PDX fire training activities will continue to implement current protocols for handling runoff to prevent water quality impacts.
2. Stormwater educational related material will be provided to the PDX fire department on a regular basis.

Tracking Measures:

1. Track stormwater related educational materials and/or training provided to the fire department.
    - In FY2023, the Port provided education materials in the form of environmental training to the PDX Aircraft Rescue and Firefighting Department. The objectives of the training are:
        - Stormwater Awareness and BMPs
        - SPCC and Spill Response Plans and Procedures
        - Regulated Materials and Management

Measurable Goals:

1. Provide educational materials to local fire district, as needed.

OM-4: GIS System and Asset Management Database

BMP Description:

- All Port storm system maps are available to operations and administrative personnel through the Port GIS interphase located on Navigator (the Port's intranet). The Port GIS System is updated regularly.

Implementation Tasks:

1. Create a tracking system for illicit discharges to identify repeat illicit discharges over time in the MS4 map.
2. Develop an outfall inventory with locations, unique identifier, and receiving water information for each outfall. Add and maintain outfall inventory with collection area characteristics to the MS4 map.
3. Add municipal structural stormwater facilities to the GIS database within 1 year of construction completion.

Tracking Measures:

1. Track the location and drainage area of new public and private water quality facilities as applicable.
    - The Port tracks the location and drainage areas of new public and private water quality facilities in the Port GIS System. In FY2023, no new public or private water quality facilities were constructed.
2. Track the number of outfalls in the GIS inventory.
    - The Port tracks the number of outfalls in the Port GIS System. There are 161 outfalls in the MS4 GIS inventory. Note that the inventory includes outfalls adjacent to the MS4 Permit areas, as shown in the MS4 Maps. Table 6-6 provides a summary of the outfalls in the Port's MS4 GIS inventory in FY2023.

Table 6-6. Outfalls in the Port's MS4 GIS Inventory			
Owner	Outfalls Within the MS4 Permit Area	Adjacent Outfalls	Total
Port of Portland	109	20	129
City of Portland	13	8	21
Unknown	2	9	11
Total	124	37	161

3. Track the number of municipal structural stormwater facilities in the GIS inventory.
    - The Port tracks the number of municipal structural stormwater facilities in the Port GIS System. There are 266 engineered stormwater quality facilities in the Port's GIS inventory in FY2023. Stormwater quality facilities include but are not limited to swales, infiltration basins, filter vaults, oil water separators and sediment manholes.

Measurable Goals:

1. Maintain MS4 Maps as described in the implementation task.
    - The Port tracks the number of municipal structural stormwater facilities in the Port GIS System.
2. Maintain MS4 Maps in the SWMP Document Library.
    - The Port maintains the current MS4 Maps in the SWMP Document Library.
3. Update mapping discrepancies that are observed.
    - The Port updates the MS4 Maps as needed when mapping discrepancies are observed. No discrepancies were observed in FY2023.

OM-5: Winter Weather Management

BMP Description:

- The Port's winter weather management activities related to public roads apply to the Port's jurisdictional boundary at PDX only. These roadways include Airport Way, Frontage Road, Airtrans Way, Air Cargo Road, Courier Court, Airway Circle, and NE 82nd Avenue. The Port typically contracts snow-removal activities (i.e., plowing) for these roads. Snow removal is initiated if the forecasted snow level is greater than 0.5 inch. Sand is not used on these roadways. If chemical deicers are needed, MX crews apply them. Chemical deicers are applied when forecasted temperatures are <32°F with moisture present on roadways. For elevated surfaces, chemical deicers are applied when forecasted temperatures are <36°F. If snow accumulation continues, deicers are applied after plowing. Potassium acetate is applied for pretreatment and throughout most storms. If forecasted precipitation is >1 inch, or if conditions dictate (freezing rain, rain, wet snow), sodium acetate may be applied. Sodium acetate is stored in a covered maintenance storage building at PDX. Potassium acetate is stored in aboveground storage tanks within secondary containment at PDX.

Implementation Tasks:

1. When chemical deicers are applied to public roads in the Port's jurisdiction, application equipment will be calibrated by weight and volume to apply deicers at the suggested rates per the manufacturer's requirements to avoid overapplication.

Tracking Measures:

1. Track the number of winter storms, amount of materials used, and quantities and locations of materials used.

- In FY2023, the Port experienced 5 days of winter events, and winter maintenance was conducted. The Port applied 3,820 gallons of potassium acetate over 40.2 lane-miles and 6 tons of sodium acetate (solid) over 13.9 lane- miles. Deicers were applied during winter events along Airport Way, Frontage Road, Airtrans Way, Air Cargo Road, Courier Court, Airway Circle, and NE 82nd Avenue.

Measurable Goals:

Not applicable.

OM-6: Litter Control

BMP Description:

- The Port conducts litter pickup and vegetation management activities to ensure performance of all stormwater system features and to protect stormwater quality. The PDX airfield is heavily patrolled for foreign object debris that can be ingested into jet engines. The Port also implements a Corrective Action Plan (CAP) system, which is an internal system for reporting observed issues such as illegal dumping and homeless camps. Once an item is entered into the CAP system, it is assigned to a Port staff member who is responsible for addressing the issue and coordinating clean-up.

Implementation Tasks:

1. Continue to implement the CAP system for responding to reports of dumping.
2. Continue litter pickup and vegetation management activities to ensure performance of all stormwater system features and to protect stormwater quality.

Tracking Measures:

Not applicable.

Measurable Goals:

1. Continue to implement the CAP system.
    - In FY2023, the Port continued to implement the CAP system to report observed issues such as illegal dumping and homeless camps.

7.1.7 Element #7: Industrial and Commercial Facilities

IND-1: Screen Existing and New Industrial and Commercial Facilities

BMP Description:

- Facilities with significant industrial or commercial activities within the Port's jurisdiction are covered by a DEQ-issued 1200-Z or Individual NPDES permit. Such facilities include portions of PDX, T2, T4, T5, T6, Navigation Base, and select tenant properties. Screening of existing and new industrial facilities primarily applies to existing and new tenants occupying property not otherwise subject to an industrial stormwater permit. The City conducts screening of facilities for 1200-Z or Individual NPDES permit coverage in the Port's jurisdiction. The Port also screens new tenants and refers new tenants who may require permit coverage to the City for further screening or requires new tenants operating within areas of Port managed permits to become co-permittees on the Port's Individual NPDES permit or obtain their own 1200-Z permit.

Implementation Tasks:

1. Coordinate with the City over the permit term to track the results of screening industrial facilities in the Port's MS4. Track tenants listed as co-permittees on Port permits.

Tracking Measures:

1. Track leaseholders that have an industrial permit in the Port's MS4 area.

- In FY2023, the Port tracked leaseholders that have an industrial permit in the Port's MS4 area.

2. Track new co-permittees on Port 1200-Z and PDX Individual NPDES permits.
   - In FY2023, one new co-permittee was added to the PDX Individual NPDES permit.
   - In FY2023, one new co-permittee was added to the T2 1200-Z permit.

Measurable Goals:

Not applicable.

IND-2: Address High Pollutant Source Facilities

BMP Description:

- The Port's property includes a variety of industrial and commercial facilities both with and without 1200-Z or Individual NPDES industrial stormwater permits. The Port follows an established strategy for identifying and inspecting priority facilities. The City of Portland conducts inspections of Port tenants with 1200-Z or Individual NPDES stormwater permits.
- The Port maintains a list of priority facilities that have the potential to contribute substantial pollutant loads to the MS4. Priority facilities are inspected annually based on an evaluation of established criteria outlined in the Port's procedures.

Implementation Tasks:

1. Continue to implement the Port's specific Municipal Stormwater Permit Industrial Facility Inspection Program that addresses 1) facility types or activities to prioritize for inspections; 2) inspection procedures, documentation standards, and frequency of inspections; and 3) the process to assess and track whether industrial and commercial facilities are in compliance with ordinances related to discharges to the MS4.
2. Review and as necessary update the industrial/commercial facilities strategy and post changes on the Port of Portland website for at least 30 days prior to submission to DEQ as required prior to November 1, 2023.

Tracking Measures:

1. Report on the status of updating the Industrial and Commercial Facilities Strategy.
   - In FY2023, the Port updated its Industrial and Commercial Facilities Strategy. The draft document was posted to the Port's public website for 30 days prior to finalizing for DEQ submittal.
2. Track the number of facilities inspected annually.
   - In FY2023, 45 industrial and commercial facilities were inspected.
3. Track improvements made to priority facilities as a result of inspections.
   - Improvements included the following: 1) replaced an uncovered scrap metal container with a covered container; 2) placed stored used tires under cover; 3) cleaned identified catch basins; 4) posted spill procedures at fuel tanks, outdoor storage areas, and in material storage areas; 5) provided cover for brake k pads and other scrap metal; 6) ensured wash pads were used correctly; 7) ensured drip pans were available and used properly; and 8) ensured correct fueling practices.

Measurable Goals:

1. Update the Industrial and Commercial Facilities Strategy.
   - This was completed in FY2023. See the tracking measures above.
2. Conduct annual inspections at priority facilities.
   - This was completed in FY2023. See the tracking measures above.

7.1.8 Element #8: Infrastructure Retrofits and Hydromodification Assessment Update

RET-1: Implement Public Education Measures to Protect Stormwater Quality

BMP Description:

- The Port's 2014 Hydromodification Report states that the majority of the Port's MS4 stormwater discharges directly to the Willamette and Columbia Rivers and the Columbia Slough.
- The report states there is no current risk of Port runoff causing hydromodification impacts in these receiving waters.
- The Port's 2014 Stormwater BMP Retrofit Plan identifies retrofit measures designed to help improve water quality.

Implementation Tasks:

1. No further work is needed to address hydromodification impacts.
2. Conduct an assessment of progress in implementing the retrofit plan and consider updates as needed related to new goals and priorities and planned projects.
3. Continue to implement retrofit measures identified in the 2014 Stormwater BMP Retrofit Plan.

Tracking Measures:

1. Track retrofit activities.
    - The Port tracks retrofit activities and projects on an ongoing basis. The Port has been working to implement its retrofit strategy and plan since 2014. Stormwater quality retrofit projects completed since that time have included bio-infiltration basins, sediment maintenance holes, bioswales, pervious pavement, portable media filters, and vault treatment facilities. These projects have treated runoff from approximately 275 acres of impervious surfaces, preventing a significant pollutant load from discharging to receiving water bodies. For additional information on the Port's retrofit activities, see Appendix C.

Measurable Goals:

1. Provide DEQ with an assessment and outcomes related to the creation of the Port's Retrofit Strategy.
    - The Port's Infrastructure retrofit and hydromodification assessment update is provided to DEQ in Appendix C
2. Maintain inventory of completed retrofit projects during the permit term.
    - The Port is actively maintaining an inventory of completed retrofit projects during the permit term.

7.1.9 Element #9: Port's MS4 Training

TRN-1: MS4 Permit Training

BMP Description:

This section presents the status of implementing the Port's multi-year and multi-topic training strategy to address stormwater education for Port staff. The Port's 2021 MS4 Permit requires training for Port staff in several stormwater-related categories listed below.

- Illicit discharge detection and elimination
- Construction site runoff controls
- Post-construction site stormwater management

- Pollution prevention and good housekeeping for municipal operations
- Industrial and commercial facilities stormwater management
  - Newly hired staff are trained in the environmental duties associated with their new position during onboarding. Existing staff receive refresher training in the environmental-related duties of their position annually. All staff are trained on updated or changed procedures throughout the permit term as changes occur.
  - The MS4 Permit includes the training requirements as shown below. In some cases, the language for the listed Permit requirements has been condensed.
  - The 2022 SWMP Table 3-15 outlines the Port's strategy for conducting the required stormwater training for Port staff.

MS4 Permit:

1. Schedule A.3.c.vi: Illicit Discharge Detection and Elimination Training and Education
   - The co-permittees must ensure that all persons responsible for investigating and eliminating illicit discharges and illicit connections into the MS4 are appropriately trained in such activities. All staff directly responsible for conducting dry-weather screening activities or responding to reports of illicit discharges and spills into the MS4 must be properly trained to conduct such activities, and training strategies and frequencies for staff must be documented and described or referenced in the SWMP Document.
2. Schedule A.3.e.vii: Long-Term Operation and Maintenance Training and Education
   - The co-permittees must ensure that staff responsible for performing post-construction runoff site plan reviews, administering the post-construction program requirements, and performing O&M or evaluating compliance with long-term O&M requirements are trained or otherwise qualified to conduct such activities. Staff training strategies and frequencies must be described or referenced in the SWMP Document.
3. Schedule A.3.f.x: Pollution Prevention and Good Housekeeping for Municipal Operations: O&M Staff Training
   - The co-permittees must continue to ensure that staff responsible for evaluating O&M practices, evaluating compliance with long-term O&M requirements, or ensuring pollution prevention at facilities and during operations are trained or otherwise qualified to conduct such activities. Training strategies and frequencies for staff must be described in the SWMP Document.
4. Schedule A.3.g.iii: Commercial & Industrial Facility Inspection Staff Training
   - The co-permittees must ensure that staff responsible for inspecting and evaluating commercial and industrial facilities, evaluating compliance with municipal ordinances related to discharges to the MS4, or ensuring pollution prevention at facilities through inspections and/or provision of educational materials on stormwater management are trained or otherwise qualified to conduct such activities. Staff training strategies and frequencies must be described in the SWMP Document.

Stormwater Training Topics:

1. Identifying and reporting illicit discharges (including procedures for enforcement and follow-up actions).
2. Dry weather screening procedures, documentation, reporting, and follow-up actions.
3. Best practices and new technologies for erosion prevention and sediment control.
4. Proposed or adopted changes to stormwater design standards and stormwater-related land use policies.

5. Port site inspection processes and documentation procedures (including violation enforcement processes).
6. O&M best practices for stormwater management facilities.
7. Inspection, cleaning, and documentation/tracking procedures for MS4-related structures (catch basins, storm drains inlets, and pipes)
8. Stormwater pollution prevention and good housekeeping practices for field operations.
9. Facility stormwater pollution prevention planning and best practices.
10. Integrated pest management and proper application of pesticides and fertilizers.
11. Industrial and commercial facility inspection procedures.

Tracking Measure:

- In FY2023, 68 new employees received the environmental spill response and stormwater training that includes all stormwater training topics listed above. In addition, the 218 existing employees received the annual refresher on environmental spill response and stormwater training:
    - PDX – 97 employees
    - AARF – 34 employees
    - Port Construction Services – 6 employees
    - MFM – 21 employees
    - NAV – 43 employees
    - Marine Security – 17 employees
- In FY2023, 18 Port Construction Services staff received additional training on Construction Erosion Prevention and Control.

Section 8: Adaptive Management Process Implementation and Proposed SWMP Changes

As it has, since Permit Year One, the Port continues to use adaptive management to modify and improve BMPs and to implement practices that reduce pollutant loading to the maximum extent practicable. This process involves direct coordination with operating area personnel who provide suggested BMP modifications. In the 2023 MS4 reporting year, an adaptive management process was used to ensure all viable ideas were heard, documented, and implemented. Examples include:

- PDX and MFM have continued to refine data collection for cleaning and documenting maintenance of the storm sewer system.
- In 2017, the Port installed a 333-cartridge stormwater treatment vault system at PDX in Drainage Basin 7. Following commissioning, the vault system did not appear to function as originally designed, so a performance study was initiated and as a result, the pump logic and controls were reconfigured, enhancing the system's treatment capacity.
- In 2018, the Port installed a proprietary stormwater treatment cartridge vault at PDX in Drainage Basin 5. Following commissioning the performance of the vault system was monitored and key retrofits were identified, including the installation of a weir wall. Performance monitoring has continued, and additional key retrofits have been identified. These additional retrofits have been added to the capital improvement project portfolio, and construction is planned for summer 2025.
- In the reporting year 2021, the Port constructed stormwater treatment system at T4 and the Navigation Facility. Performance monitoring of these systems continued through the 2023 reporting year.
- Construction of a vegetated infiltration basin at T6 was completed in 2022. This facility treats stormwater runoff from approximately 20 impervious acres in Basin K and 60 in Basin L. The performance monitoring of this system continues through the 2023 reporting year.
- The Port added T6 to its Stormwater DSM in 2021 and added an additional 10 acres in September 2022.

The Port prepared the 2022 SWMP to reflect the 2021 MS4 Permit requirements (effective October 1, 2021). The Draft 2022 SWMP was open for public comment for 30 days in September/October 2022. No public comments were received. The 2022 SWMP was finalized and dated November 1, 2022, and was approved by DEQ on December 16, 2022.

The Port updated the 2022 SWMP during FY2023 to document its updated construction enforcement procedures (see Section 7.1.4). No additional proposed changes were made to the SWMP at this time. A Revision Log is included in the updated SWMP (Table A-1) to document SWMP changes. The revised SWMP is posted on the Port's Stormwater Management Page of their public website.

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Section 9: 2021 MS4 Permit Additional Elements

Schedule B.3.l of the 2021 MS4 Permit requires the Port to track and report on additional elements that are found in specified sections of the permit. A summary of those elements for FY2023 reporting is as follows:

- Schedule A.1.b.iii: Schedule A.1.b.iii requires co-permittees to submit the details of all corrective actions implemented that are associated with this section of the permit (Water Quality Standards). The Port has no corrective actions to report for FY2023.
- Schedule A.3.c.vii: Schedule A.3.c.vii requires co-permittees to include updates in the annual report regarding any capital improvements needed or implemented associated with the IDDE program. In FY2023, there were no capital improvement programs needed or implemented that were associated with the IDDE Program.
- Schedule B.3.j: In FY2023, the City's Urban Growth Boundary expansion areas were unchanged. Therefore, the Port issued no post-construction permits for land use changes or new development activities that occurred within the City's Urban Growth Boundary expansion areas.
- Schedule D.3.b: Schedule D.3.b. requires co-permittees to develop and submit a mercury minimization assessment that documents the Port's current actions, such as BMPs implemented, that reduce the amount of solids discharged into and from the permitted MS4 system (similar to the actions currently required by 2021 Permit Schedule A). The Port's Mercury Minimization Assessment was submitted with the FY2022 Annual Report as Appendix A.

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Appendix A: Port of Portland Low Impact Development (LID) Strategy

November 1, 2023

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Port of Portland Low Impact Development (LID) Strategy

November 1, 2023

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Section 1: Introduction/Background

Schedule A.3.e.ii of the Port of Portland's (Port's) Phase I National Pollutant Discharge Elimination System (NPDES) municipal separate storm sewer system (MS4) Permit (Permit) requires co-permittees by November 1, 2023, to *"review and update or develop and begin implementation of a strategy to require to the maximum extent feasible, the use of Low Impact Development (LID) and Green Infrastructure (GI) design, planning and engineering strategies intended to minimize effective impervious area or surfaces, and reduce the volume of stormwater discharge and the discharge of pollutants in stormwater runoff from development and redevelopment projects"*.

The Permit requires the co-permittees to document this LID strategy in the subsequent annual report and incorporate or reference the strategy in the SWMP Document after completion and DEQ approval. The purpose of this document is to summarize and document the Port's current LID strategy to meet these permit requirements.

Section 2: Port Stormwater Design Standards

To address the 2011 City of Portland/Port of Portland NPDES MS4 permit, the Port undertook a significant effort to develop their own Stormwater Design Standards Manual (DSM) which includes strategies for Stormwater Management (SWM). Prior to development of this manual, the City of Portland administered the post-construction stormwater quality related requirements in the Port's jurisdiction. The Port developed their own DSM and SWM strategies to better reflect the unique characteristics of development activities at the Portland International Airport (PDX) and Marine Terminal 6 (T6), thus acquiring authority over post-construction stormwater management at these specific Port-owned properties. Development of the DSM and SWM also allowed the Port to address permit requirements related to prioritizing low impact development/green infrastructure, optimizing on-site retention, and targeting predevelopment hydrologic functions as much as practical given the typical Port development and land use constraints at PDX and T6.

The DSM was initially completed and became effective in January of 2014 and since that time, has been applied to "any new development or redevelopment project that creates or replaces 500 square feet or more of impervious surface" occurring within the DSM's applicable areas. Since 2014, as the DSM has been implemented, additional refinements have been made using an adaptive management approach. The latest version of the DSM is dated 2017, with minor revisions in 2019 and 2020.

Section 3: Port LID Strategy

The Port's DSM includes eight SWM standards governing the design of stormwater management BMPs and strategies at applicable Port facilities. These SWM standards first prioritize the implementation of LID and GI strategies, as each needs to be considered during design and development activities and documented with plan submittal. Any variance from LID and GI standards must be fully described and approved following the DSM Variance Request process. The DSM

includes specific requirements for each of the eight SWM standards, including a compliance approach and implementation considerations. The eight SWM standards are as follows:

1. Low-impact Development: Identifies strategies and practices for low-impact development that must be considered on each project.
2. Infiltration: Defines a series of infiltration strategies which must be implemented on a project depending on project and site conditions.
3. Water Quantity Control: Establishes water quantity control objectives for flooding and requires stormwater modeling to demonstrate compliance.
4. Water Quality - Capture and Treat: Defines the minimum water quality BMP design treatment capacity that must be provided to meet NPDES MS4 permit requirements for water quality treatment.
5. Source Control: Identifies the need for source controls to be implemented based on a set of standards adopted from the City of Portland. Additional source controls may be required at the discretion of the Port to manage specific pollutants of concern.
6. Hazardous Wildlife Attractants: Summarizes key requirements for the siting and design of stormwater management BMPs to minimize the attraction of hazardous wildlife, in accordance with Federal Aviation Administration (FAA) related requirements.
7. Floodway and Natural Resource Protection: Requires designers to comply with the local, state, and federal regulations that protect natural resources and floodways. These regulations may limit or restrict development in regulated areas and may require additional coordination with the Port during the siting of BMPs and drainage systems.
8. Erosion and Sediment Control: Requires designers to comply with the City of Portland, Oregon DEQ, and Port requirements for erosion and sediment control on project sites with stormwater discharges from construction sites.

With respect to the Port's LID Strategy, it is mainly implemented through SWM standards 1 and 2 as follows:

1. **Low-impact Development Requirements:** The Port has identified a set of LID practices that must be considered for applicability on new development and redevelopment projects. These practices are classified under three general LID strategies which include the following:
    1. minimize disturbance of sensitive areas (site selection and layout),
    2. minimize impact of development (impervious surface footprint minimization), and
    3. manage runoff from disturbed areas (green infrastructure and runoff management).

    Designers are required to review the above list of LID strategies and a supporting list of practices; consider each for applicability to the project; and, where applicable, implement the practices. The consideration and implementation of the LID strategies and associated practices is required to be documented in a checklist, which is a required component of the SWM submittal to the Port. Completion of the LID portion of the checklist requires that designers provide the following information:

    - Assessment of applicability for each LID strategy and supporting practices.
    - A description of how applicable LID practices were incorporated into the project design.
    - Justification for any strategies or practices deemed not applicable for the project or site, including project or site constraints, and documentation of any decisions or guidance provided by the Port.
    - Identification of other LID considerations that were incorporated into the project that were not already covered by the checklist.

2. **Infiltration Requirements:** Uncontrolled discharges from developed areas have the potential to increase peak flow rates and flow volumes when compared to predevelopment conditions. Strategies that promote infiltration (where practicable) help reduce runoff volumes, peak flow rates, and the duration of discharges by retaining stormwater on-site. Infiltration also provides for the natural treatment of stormwater as it percolates through the soil and recharges groundwater aquifers. Best management practices (BMPs) that promote infiltration are considered green infrastructure (GI) BMPs. The Port's LID strategy includes implementation of infiltration requirements that result in the implementation of GI.

   The Port requires on-site infiltration to the maximum extent practicable. Infiltration to the maximum extent practicable is defined as selecting an appropriate, site-specific infiltration strategy. Designers must select one of the three infiltration strategies, as defined below, based on a list of applicable site criteria (i.e., soil infiltration rates, separation from the seasonal high groundwater elevation, known contamination of groundwater or the soil column, etc.). Compliance with the Infiltration standard requires selection of an infiltration strategy that maximizes infiltration based on the project and site applicability criteria.

   1. Full infiltration of the water quality design storm
   2. Partial infiltration of the water quality design storm
   3. No reliance on infiltration

The Port's SWM also includes design criteria and BMP fact sheets for GI BMPs that are required for meeting infiltration requirements. These include facilities such as pocket wetlands, bioretention facilities, infiltration trenches, vegetated swales, planter boxes, green roofs, and pervious pavement. The Port is planning to update the SWM to meet permit requirements prior to November 1, 2024. These updates will likely include more explicit language regarding the selection of BMPs in priority order with green infrastructure as a top priority and mechanical devices as a lower priority when green infrastructure is shown to be infeasible. These planned changes will further enhance and build upon the Port's current LID strategy.

Section 4: Summary

In summary, since 2014, consistent with the Permit (Schedule A.3.e.ii), the Port's LID strategy has required *"the use of Low Impact Development and Green Infrastructure (LID/GI) design, planning, and engineering strategies intended to minimize effective impervious area or surfaces and reduce the volume of stormwater discharge and the discharge of pollutants in stormwater runoff from development and redevelopment projects."* SWM updates to further and more explicitly emphasize priorities around BMP selection are also planned for 2024.

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Appendix B: Storm Water System Enforcement Rules

Final Draft – October 2, 2023

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THE PORT OF PORTLAND

STORM WATER SYSTEM ENFORCEMENT RULES

FINAL DRAFT: UPDATED OCTOBER 2, 2023

1. AUTHORITY

Authority for the adoption of these Storm Water System Enforcement Rules ("Rules") by the Executive Director of The Port of Portland ("Port") is found in: (a) ORS 777.190, 778.255, 778.260, and 778.990; (b) the federal and state Clean Water Acts and regulations issued pursuant to those Acts; (c) the Port's National Pollutant Discharge Elimination System permit for the Port's municipal separate storm water system (NPDES Permit No. 101314, issued September 15, 2021, effective October 1, 2021 referred to herein as the "2021 MS4 Permit"); and (d) Ordinance 361 (as defined in Section 2).

2. INTENT

The Rules implement Port Ordinance No. 361, *An Ordinance Regulating Storm Water*, adopted March 11, 1992 ("Ordinance 361"). Ordinance 361 is intended "to regulate the discharge of storm water into Port storm sewers to minimize water pollution due to pollutants discharged in storm water," and to comply with state and federal law governing water quality permits, including MS4 permits. Schedule A of the 2021 MS4 Permit requires the Port to implement various measures relating to waters entering the Port's storm water system. Among other things, the Port must implement a program to detect, remove, and eliminate Illicit Discharges to the Port's storm water system; reduce discharges of pollutants from construction sites in its coverage area; and implement an enforcement program for Illicit Discharges and construction site discharges. The Port's obligations are described in the 2021 MS4 Permit and in the Port's most current Stormwater Management Program (SWMP) Document adopted in compliance with the 2021 MS4 Permit. In the future the Port may obtain other permits, applicable to additional Port storm water systems.

3. DEFINITIONS

3.1 Director

"Director" means the Director of Aviation or the Marine and Industrial Development Director. These Directors share responsibility for enforcement of the Rules within their respective operational areas.

3.2 Illicit Discharge

"Illicit Discharge" means any discharge to a Port-owned MS4 that is not composed entirely of storm water, except discharges specifically allowed by a Port permit or otherwise specifically authorized by law. The term includes discharges of any nature made by means of an unauthorized connection to a Port MS4.

3.3 Construction activity

"Construction activity" includes, but is not limited to, clearing, grading, excavation, and other site preparation or ground disturbing work related to the construction of residential buildings and non-residential buildings, and heavy construction (e.g. highways, streets, bridges, tunnels, pipelines, transmission lines and industrial non-building structures).

3.4 Erosion

"Erosion" is the process of carrying away soil particles by the action of water, wind or other process.

3.5 MS4

"MS4" means municipal separate storm sewer system.

3.6 Person

"Person" means individuals and businesses.

4. ENFORCEMENT; SANCTIONS

Depending on the nature of the violation and its severity, the Port may take one or more of the following actions against a Person who violates any provision of the Rules: (a) suspend or revoke a permit or other authorization to engage in a particular activity on Port property; (b) invoke remedies available in any lease, contract, or other agreement between the Port and the violator; (c) issue a citation for violation of a law or Port ordinance, punishable by a fine as authorized by ORS 777.990(2) and 778.990; (d) seek injunctive relief to enjoin a violation of the Rules; and (e) pursue any other remedy available at law. This Section applies to all Persons responsible for discharges to Port storm water facilities. Enforcement actions may be initiated by the Director or the Director's designee ("Authorized Personnel").

5. INSPECTION OF PREMISES

Authorized Personnel may inspect Port-owned property and Port storm water facilities, to determine compliance with the Rules. Where a lease, contract, or other agreement with the Port applies to property believed to be the source of an Illicit Discharge or believed to be discharging sediment or waste materials associated with construction activities, and that lease, contract, permits, or other agreement contains provisions regarding entry or inspection, Authorized Personnel shall comply with those provisions. Where no such provisions exist, Authorized Personnel shall give reasonable prior notice and entry shall be made at reasonable times during normal operating or business hours, unless Authorized Personnel determine that an emergency exists.

Owners of property where discharges to Port storm water facilities may be originating shall permit Authorized Personnel to enter for purposes of determining compliance with the Rules, upon request and with reasonable advance notice.

Authorized Personnel may seek the assistance of other regulatory authorities (such as the City of Portland and the Department of Environmental Quality), or the courts, to gain entry or to perform inspections.

6. VIOLATIONS

A violation exists when any of the following occurs: (a) a Person has made, caused, or allowed an unauthorized or Illicit Discharge into a MS4 owned or operated by the Port; (b) a Person has caused, or allowed an unauthorized discharge of sediment or waste materials associated with construction activities into a MS4 owned or operated by the Port; (c) a Person is out of compliance with a Port-approved Erosion and Sediment Control Plan; (d) a Person has made a connection to a storm sewer owned or operated by the Port without first obtaining permission from the Port; (e) any requirement of the *Schedule of Enforcement Actions*, attached hereto as **Appendix A**, has not been complied with; or (f) any requirement of a written order (including a notice of violation) of the Director or Authorized Personnel, made under authority of the Rules, is not met.

7. ENFORCEMENT MECHANISMS

If Authorized Personnel determine that a violation has occurred or is likely to occur, Authorized Personnel may offer technical assistance and education to the responsible party to prevent or correct the violation. In enforcing any of the requirements of the Rules, the Director, or Authorized Personnel may employ any of the following enforcement methods: (a) issue a warning in the form of a notice of non-compliance; (b) issue compliance orders; (c) issue a citation in the form of a notice of violation, which may include a penalty; (d) cause an appropriate action to be instituted in a court of competent jurisdiction; or (e) take such other action as the Director deems appropriate.

In taking action under this Section, Authorized Personnel shall be guided by the *Schedule of Enforcement Actions*.

8. PENALTIES

A violation of the Rules is a misdemeanor under ORS 777.990(2) and 778.990, punishable by a fine in the amount of FIVE HUNDRED DOLLARS AND NO CENTS ($500.00) for each day of violation. Penalties may also be assessed as provided for in any agreement between the Port and the violator, such as a contract, a permit or a lease. Penalties shall be due and payable immediately upon receipt of a final order issued by the Director or Authorized Personnel.

9. APPEALS

A Person subject to a notice of violation under the Rules may appeal in the manner described in this Section. The Person wishing to appeal must file a written statement with the Director, within ten (10) calendar days of the Person having received the notice of violation. The appeal shall: (a) include a copy of the notice of violation; (b) state with particularity the basis for the appeal, including a clear and concise statement of reasons why the notice of violation is believed to be in error; and (c) state the relief that is requested.

The Director shall acknowledge receipt of all appeals in writing. Appeals shall be resolved by the Director in consultation with the Port General Counsel and as expeditiously as possible. Failure of the Director to act with sixty (60) calendar days shall be deemed a denial of the appeal. The Director may delegate his responsibilities under this Section, provided that appeals shall not be heard by Authorized Personnel responsible for issuing the notice of violation.

10. SEVERABILITY

If any provision, paragraph, word, or Section of the Rules is invalidated by any court of competent jurisdiction, the remaining provisions, paragraphs, words, or Sections shall not be affected and shall continue in full force and effect.

11. EFFECTIVE DATE

The Rules are hereby adopted by the Executive Director of the Port and are effective on DATE[1].

[1] Date will be populated when the revised PDX Rules are adopted.

APPENDIX A

SCHEDULE OF ENFORCEMENT ACTIONS

Violation	Enforcement Level		
	I Notice of Non-Compliance (Warning)	II Notice of Violation	III Formal Penalty
1. *Failure to meet storm water permit co-permittee responsibilities, as listed in a Port Storm Water Pollution Control Plan (e.g., BMP implementation, employee training, spill response procedures, monthly inspections, housekeeping issues, submittal of annual compliance verification form, etc.).	X		
2. *Failure to comply with requirements of a Port held NPDES Industrial Storm Water Permit (e.g. issues related to industrial permit compliance with tenants who are not co-permittees).	X		
3. Evidence of Illicit Discharges present (stains, sludge, eroded concrete, etc.).	X		
4. Evidence of a discharge of sediment or waste materials associated with construction activities.	X		
5. First failure to correct one or more of violations 1-4 by the date specified in the notice of non-compliance.		X	
6. Observed Illicit Discharge or observed discharge of sediments or waste materials associated with construction activities (see #4 above) to the Port's storm sewer system.		X	
7. **Observed Illicit Discharge or observed discharge of sediments or waste materials associated with construction activities (see #4 above) from non-Port owned property into the Port's storm sewer system.		X	
8. Second failure to correct one or more violations 1-4, or first failure to correct one or both violations 6 or 7.			X
9. Intentional dumping of material into the Port's storm sewer system.			X
10. Unauthorized connection to the Port's storm sewer system.			X

*Co-permittee specific.

**Includes evidence of Illicit Discharge in areas draining to the Port's MS4 System (stains, sludge, eroded concrete, etc.) Also includes evidence of discharges of sediments or wastes associated with construction activities to the Port's MS4 System.

Appendix C: Retrofit and Hydromodification Assessment

November 1, 2023

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Retrofit and Hydromodification Assessment
November 1, 2023

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Section 1: Introduction/Background

In the Port of Portland's (Port's) previous 2011 Phase 1 National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit (Permit), Schedule A.5 required the Port to conduct a hydromodification assessment to examine the Port's hydromodification impacts related to MS4 discharges, including erosion, sedimentation, and alteration to stormwater flow, volume, and duration that may cause or contribute to water quality degradation. The report was required to "identify strategies and priorities for preventing or reducing hydromodification impacts related to the co-permittees MS4 discharges and identify or develop effective tools to reduce hydromodification". The report was submitted to DEQ prior to the required November 1, 2014, deadline.

Also included in the 2011 Permit, in Schedule A.6., was a requirement to develop a stormwater quality retrofit strategy and plan that applied to developed areas identified as impacting water quality and underserved or lacking stormwater controls. The strategy and plan were required to include "a retrofit control measure project or approach priority list, including rationale, identification and map of potential stormwater retrofit locations where appropriate, and an estimated timeline and cost for implementation of each project or approach." As with the Hydromodification Assessment, the Retrofit Strategy and Plan were also submitted to DEQ prior to the November 1, 2014, deadline.

Schedule A.3.h. of the Port's 2021 NPDES MS4 Permit requires the Port by November 1, 2023, to "consider the impacts of policy, capital improvements, and retrofit projects on MS4 discharges to receiving waters, considering the goals and proposed actions described in the previous permit's Hydromodification Assessment and Stormwater Retrofit Strategy reports" (i.e., the 2014 submittals). Specifically, the Port is required to prepare "an assessment of any outcomes related to the Hydromodification Assessment and Stormwater Retrofit Strategy Reports." This assessment is required to include the following:

- An assessment of how the Hydromodification Assessment and Stormwater Retrofit Strategy have been used, considered, or implemented since the time the reports were completed.
- Progress toward or completion of projects identified in the Retrofit Strategy priority list, and a qualitative assessment of the benefits of those projects.
- Description of any further actions taken as a result of the Hydromodification Assessment, and a rational for those actions since the writing of the reports.
- Narrative describing progress toward addressing gaps in the hydromodification information or data related to waterbodies within the co-permittees' jurisdiction as identified in the Hydromodification Assessment; and,
- New goals, tools, priorities, and planned or potential projects for addressing ongoing hydromodification and/or water quality impacts resulting from historical development/infrastructure, and for improving retrofit planning, considering information gathered in the time since the completion of the reports.

The Permit requires the co-permittees to document this assessment in the third annual report (i.e., the 2023 annual report) as an appendix or subsection. This assessment was prepared to fulfill this requirement and is being included as an appendix to the 2023 annual report.

Section 2 of this assessment provides a summary of the previous retrofit strategy and plan; progress made since the strategy and plan were submitted in 2014; and goals for moving forward. Section 3 of this assessment provides a summary of the previous hydromodification assessment, progress made since the assessment was submitted in 2014, and goals for moving forward. Section 4 provides an overall summary.

Section 2: 2014 Retrofit Strategy Summary

2.1 What was included in the Retrofit Strategy and how has it been used, considered, or implemented since 2014?

The Port's 2014 Stormwater BMP Retrofit Plan (Gresham, Smith and Partners, and Geosyntec Consultants, 2014) was developed to identify structural treatment BMPs as well as the removal or disconnection of impervious areas from discharging directly to storm sewers or streams where feasible. In addition, to maximize efficiency in implementing the Retrofit Plan, the goal was to combine retrofits with other capital improvement projects when possible. Another goal of the plan was to address pollutants of concern in applicable TMDLs. The Plan included a summary of both current (at the time) stormwater retrofits and a priority stormwater retrofit project list for potential future implementation as follows:

Current (in 2014) Stormwater Retrofit Controls:

- Terminal 4 Pavement Removal Project – Removed 1.24 acres of impervious area and replaced with clean topsoil. The project was completed in September 2013.
- Stormwater Master Planning – This project included water quality modeling, development of the retrofit strategy, identification of candidate retrofit areas and potential retrofit measures, and the development of a Port Stormwater Design Standards Manual. The Stormwater Master Plan was completed in 2015.

Priority Stormwater Retrofit Project List for Potential Future Implementation:

- Navigation Base – Stormwater Pollution Control Plan Development – This project would include development of a Stormwater Pollution Control Plan (SWPCP) to identify potential structural and non-structural BMPs. The project was anticipated to be completed in the 2014-2015 fiscal year.
- Terminal 4 – Cartridge Filter Vault in Drainage Basins L and M – A cartridge filter vault or equivalent treatment BMP was planned for installation to treat pollutants (E. Coli specifically) in selected drainage basins (approximately 11 acres) at Terminal 4. The project was anticipated to be constructed in the 2016-2017 timeframe.
- Terminal 4 – Downspout Planter Boxes in Drainage Basins N and OP – Downspout planter boxes were planned for installation at several buildings identified to treat pollutants (E. Coli specifically) in selected drainage basins at Terminal 4. The project was anticipated to be constructed in the 2017-2018 timeframe.
- Terminal 6 – Infiltration Trenches in Drainage Basin G – Infiltration trenches were planned for installation in targeted locations to treat pollutants (E. Coli, BOD5, and phosphorus, specifically) in a drainage basin at Terminal 6. The project was anticipated to be constructed in the 2018-2019 timeframe.
- PDX – Downspout Planter Boxes and Infiltration Trenches in Drainage Basins 10, 11, and 12 – Downspout planter boxes were planned for installation to treat roof runoff from targeted buildings and infiltration trenches were planned for installation to treat stormwater from selected drainage areas at PDX. This project was anticipated to be constructed in the 2019/2020 timeframe.

Since 2014, the Port has been using the strategy to implement projects. The status of project implementation is provided in Section 2.2.

2.2 What progress has been made toward completion of projects identified in the Retrofit Strategy priority list, and what have been the benefits of those projects?

The status of the projects listed above is as follows:

- Navigation Base – Stormwater Pollution Control Plan Development – This plan was completed October 19, 2017, and subsequently revised in 2019 and 2021. This plan includes BMPs for all three drainage basins. Specific BMPs include scheduled pavement sweeping; catch basin cleaning and replacement of catch basin sedimentation filters; monthly inspections of stormwater discharge quality, stormwater facilities, industrial areas, hazardous and waste materials handling and storage areas, fuel transfer areas, pesticide mixing area and spill kits. Stormwater quality testing is also performed at a minimum of four times annually.
- Terminal 4 – Cartridge Filter Vault in Drainage Basins L and M – The Port installed a stormwater bio-infiltration basin in Basin M in 2021. The bio-infiltration basin treats runoff from approximately 14 acres of impervious surface. Basin L is leased to Kinder Morgan and since 2014 Kinder Morgan has installed a pH air sparging unit, downspout planter boxes and an infiltration basin. The planter boxes treat runoff from approximately 0.7 acres, and the infiltration basin treats runoff from approximately 1 acre.
- Terminal 4 – Downspout Planter Boxes in Drainage Basins N and OP – This project was not implemented.
- Terminal 6 – Infiltration Trenches in Drainage Basin G – Infiltration trenches were not installed in Basin G. A bio-infiltration basin was installed in Basins K and L in 2021. This stormwater treatment facility currently infiltrates 100% of the design storm runoff from a combined 77 acres of impervious surfaces in Basins K and L.
- PDX – Downspout Planter Boxes and Infiltration Trenches in Drainage Basins 10, 11, and 12 – This project was not implemented.

Additionally;

- Navigation Base – Stormwater Improvements - A proprietary sedimentation maintenance hole and stormwater treatment system was installed in 2021. This combined system treats the water quality flow rate for 1.31 impervious acres in drainage basin A, calculated following the 1200-Z Industrial Stormwater Permit Tier II design storm criteria.
- Navigation Base – Portable Media Filters (PMF) – Four PMF were installed at roof gutter downspouts in Basin B in 2018 to treat runoff from approximately 0.12 acres. Performance monitoring is performed twice annually. Each PMF was rebuilt in 2023.
- Terminal 4 – Entrance Road Rehabilitation Phase I & II - New bioswales and an infiltration pond were constructed in basin Q in 2013 to treat runoff from approximately 1 acre. In 2015, pervious pavement replaced 0.6 acres of non-pervious pavement in basins M, O and N.
- PDX – Airtrans Way Reconstruction – In 2018, stormwater treatment catch basins and a vault were installed to treat 3.2 acres of redeveloped impervious surfaces. The stormwater treatment vault was designed to provide future treatment for an additional 10.3 acres of impervious surfaces. Full buildout of the vault is planned for 2024.
- PDX – East Landside Stormwater Facility – In 2016, a stormwater treatment vault was installed in Basin 8. This vault provides treatment for 36 acres of impervious surfaces.

- PDX – Basin 7 Regional Stormwater Facility – In 2017, three stormwater treatment vaults were installed in Basin 7, adjacent to an existing vault. New pumps, plumbing and logic serving all four vaults was also installed. This new complex provides treatment for 141 acres of impervious surfaces.

In terms of benefits provided, these projects are providing treatment of runoff from approximately 275 acres of impervious surfaces, preventing a significant pollutant load from discharging to receiving water bodies.

2.3 What are the new goals, tools, priorities, and planned or potential projects for improving retrofit planning to address water quality impacts resulting from historical development/infrastructure?

With respect to tools for supporting retrofit planning, the Port maintains a 10-year capital improvement project portfolio that prioritizes and initiates projects for construction. Stormwater treatment projects are prioritized by treatment need and treatment provided. To track required treatment, the Port utilizes a stormwater treatment tracking tool, initiated in 2015. This tool tracks required treatment for both existing and proposed impervious surfaces at PDX and T6. Similar to a check book, this tool tracks treatment credit and debit. The Port is also currently working on a GIS update to complete refined delineations of the Port's impervious surface areas. This GIS update will also include refined delineations of water quality facility treatment areas to further assist the Port with tracking treated and non-treated impervious surfaces and prioritizing stormwater treatment projects. The Port's ultimate goal is to provide stormwater treatment for all impervious areas.

Planned or potential projects for improving water quality include:

- PDX Basin 6 Stormwater Treatment Project – The design for this project is currently at 90% and construction is scheduled for 2024. When complete, this regional facility will provide treatment for approximately 50 acres of impervious surfaces.
- PDX Airtrans Way Reconstruction – As mentioned above, a stormwater treatment vault installed at PDX in 2018 was designed to provide future treatment for an additional 10.3 acres of impervious surfaces. Full buildout of this vault is planned for 2024.

Section 3: 2014 Hydromodification Assessment Summary

3.1 Were there any identified gaps in the hydromodification information or data related to waterbodies within the Port's jurisdiction and, if so, what progress has been made in addressing gaps?

The Port's 2014 Hydromodification Assessment did not identify any informational or data gaps in the hydromodification assessment.

3.2 What were the results of the Hydromodification Assessment and how has it been used, considered, or implemented since 2014?

The Port's Hydromodification Assessment (Gresham, Smith, and Partners, 2014) concluded that Port MS4 discharges do not appear to be contributing to hydromodification impacts. The Assessment stated the following:

- Much of the Port's MS4 stormwater discharges directly to large rivers, the Columbia River, and the Willamette River. These rivers have relatively large flows compared to the potential increased stormwater runoff flows from development on the Port property. Comparatively, the peak runoff for Port property discharging to these rivers is so small that the discharges are not likely to contribute to potential hydromodification impacts on the Columbia River or Willamette River.
- The remainder of Port MS4 stormwater discharges to the Columbia Slough. The Slough is a flow-managed water body, which does not drain by gravity and must be pumped to manage water levels. Multnomah County Drainage District (MCDD) is designated by the US Army Corps of Engineers to operate pump stations to manage the water level and flow in the Slough for flood control purposes. Due to the flow regulation by MCDD pumps, the pump stations operations control the peak flow and volumes in the Columbia Slough rather than stormwater runoff flows. Volume in the Slough is controlled by level setting controls in the MCDD pump stations. Peak flow velocities are correlated to the pumps' operational capacities in the MCDD pump stations. Due to these factors, Port stormwater runoff does not likely contribute to channel impacts in the Slough.
- A portion of the MS4 stormwater from PDX flows through smaller conveyance channels on Port property prior to discharging at outfalls to the Columbia Slough. A stormwater management model for PDX was used to evaluate if any of these channels have flows with potentially erosive velocities. Based on the analysis, it does not appear that these small channels are currently at risk from hydromodification impacts.
- In the case of future development or redevelopment on Port MS4 applicable property, stormwater runoff controls will be guided by a stormwater management manual (either Port or City of Portland depending on location) which contains Low Impact Development practices and encourages infiltration Best Management Practices where practicable to reduce flow volumes. No additional strategies or tools need to be implemented in the foreseeable future to address potential hydromodification.

Given the conclusions from the 2014 Hydromodification Assessment, the assessment has not been used, considered, or implemented since that time other than the Port's continued implementation of stormwater design standards requiring low impact development and prioritization of infiltration.

3.3 What further actions have been taken as a result of the Hydromodification Assessment, and what was the rational for those actions?

Given the conclusions from the 2014 Hydromodification Assessment provided in Section 3.2 above, no further actions have been taken since that time other than the Port's continued implementation of stormwater design standards requiring low impact development and prioritization of infiltration.

3.4 What are the Port's new goals, tools, priorities, and planned or potential projects for addressing ongoing hydromodification?

Given the conclusions from the 2014 Hydromodification Assessment provided in Section 3.2 above, the Port does not have any new goals, tools, priorities, or planned projects to address hydromodification other than continued implementation of stormwater design standards requiring low impact development and prioritization of infiltration.

Section 4: Summary

In summary, the Port has been working to implement their retrofit strategy and plan since 2014. Stormwater quality retrofit projects completed since that time have included: bio-infiltration basins, sediment maintenance holes, bioswales, pervious pavement, portable media filters and vault treatment facilities. These projects have provided treatment of runoff from approximately 275 acres of impervious surfaces, preventing a significant pollutant load from discharging to receiving water bodies. In addition, two additional stormwater treatment facilities are planned for 2024 that will address runoff from an additional 60 acres of impervious surfaces. Moving into the future, additional water quality treatment will be addressed with future capital projects based on evolving priorities. Tracking of the impervious areas that are treated at T6 and PDX will continue to be conducted with the ultimate goal of providing treatment of runoff from all impervious surfaces.

PART III
MONITORING REPORT

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1 Introduction

This annual Monitoring Report is submitted in compliance with Schedule B of the City of Portland (City) and Port of Portland's National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Discharge Permit Number 101314. Schedule B of the MS4 permit (Table B-1) contains specific requirements on the monitoring types, locations, frequency, and parameters. This report summarizes monitoring activities conducted by the City during the 2022–23 permit year (July 1 to June 30) in accordance with Schedule B and discusses pertinent results. More information about the City's monitoring approach, including information about monitoring objectives, sample design, field and laboratory procedures, and data management, can be found in the City's 2022 MS4 Monitoring Plan.

The City's sampling activities and results are summarized in Sections 2 and 3, respectively. Section 4 includes an evaluation of trends in water quality based on the City's stormwater sampling. A map of all monitoring locations is available online at: www.portlandmaps.com/bes/ms4monitoringsitesmap. All monitoring data collected during the 2022–23 permit year have been submitted electronically to the Oregon Department of Environmental Quality (DEQ) and are made available by DEQ through DEQ's water quality monitoring data portal, the Ambient Water Quality Monitoring System.

2 Sampling Activities

The City conducts sampling and analysis of stormwater, instream, and biological (macroinvertebrates) parameters to fulfill MS4 permit requirements. The monitoring also supports and informs the City's actions in meeting Total Maximum Daily Load (TMDL) objectives related to receiving-water health. Detailed information on the City's monitoring strategy is provided in the City's 2022 MS4 Monitoring Plan, including the methods used to collect samples, frequency of collection, and the number of sampling locations.

Table 1: Summary of monitoring activities conducted during the permit year and the commitments included in the 2022 monitoring plan. A range is provided when the frequency varied by site.

	2022 Monitoring Plan		2022–23 Activities	
Monitoring Type	**Number of Sites**	**Frequency/Site**	**Number of Sites**	**Frequency/Site**
Stormwater Outfall	15	3 storm events/year	15	3 storm events
Stormwater Outfall Pesticides	15	3 storm events/ permit term	15	1 storm event
Instream	16	4 seasonal 1 storm event/year	20	4-5 seasonal 1 storm event
Fixed Instream		Not included	10	4-8 seasonal 2-4 storm events
Continuous Instream (USGS)	8	Continuous: 30-minute interval maximum	8	Continuous: 30-minute interval maximum
Macroinvertebrates	12	1 sample/year	15	1 sample

During the 2022–23 permit year, the City completed all permit-required monitoring activities (Table 1). In response to the new MS4 permit monitoring requirements in Schedule B, the City modified its instream monitoring approach to focus on collecting samples at 20 randomly selected locations. The City's 2016 MS4 Monitoring Plan included sampling at 11 fixed instream sites sampled four times per year; however, these fixed instream locations have been sufficiently characterized and are no longer included in the 2022 MS4 Monitoring Plan. While the fixed stream sites are not included, since the City's new plan was approved halfway through the monitoring season, the City continued to collect samples at the fixed sites during the 2022–23 permit year.

2.1 Stormwater Monitoring

Portland's municipal stormwater conveyance system includes approximately 1,500 stormwater outfalls that are covered by the City's MS4 permit. These outfalls vary in size, with catchment areas ranging from 0.01 to 750 acres with a mean of 9.7 acres. The outfall basins comprise a variety of different land uses and are located throughout the city in all watersheds. In 2022 the City initiated a new stormwater monitoring effort that focuses on collecting grab samples from locations representative of the City's MS4 outfall basins.

During the 2022–23 permit year, the City successfully sampled 15 stormwater outfall locations. The samples were collected from four separate storm events (Table 2). At least 0.1 inches of rain were recorded in the 24 hours prior to grab sample collection for each sampling event.

Table 2: Summary of storm events sampled as part of the City's stormwater outfall monitoring during the permit year.

Sampling Date	Number of Sample Locations	Rainfall Event Length Before Grab Sample Collection (Hours)	24-Hour Antecedent Rainfall (Inches) Prior to Grab Sample Collection
2022-10-31	15	6.6–10.1	0.24–0.35
2023-02-07	15	5.2–9.0	0.10–0.19
2023-03-23	9	5.7–7.6	0.10–0.11
2023-03-28	6	11.5–13.7	0.22–0.26

2.2 Instream Monitoring

The City collects and analyzes water quality samples from multiple streams throughout Portland that receive MS4 discharges. The City employs a probabilistic survey design to monitor Portland's waterways, with a total target of 80 perennial sites across the city's watersheds. The sample sites are divided into four panels that are sampled on a 4-year rotating basis, with a target of 20 perennial stream sites included in each panel. Seasonal (once per quarter) water quality samples are collected at each site each year. Additionally, the City aims to collect one targeted sample during a storm event at each instream site each year. Given the program design, the number of monitoring sites in each watershed varies from year to year.

During the 2022–23 permit year, the City continued to collect samples from the fixed ambient stations in accordance with the City's 2016 Monitoring Plan. The City collected water quality samples from all but one of the fixed sites. One site on Tryon Creek was not sampled during the permit year due to access limitations and safety concerns associated with camping activities at the site. The City discontinued sampling at the fixed sites at the end of the 2022–23 permit year. The fixed sites monitoring program included 11 fixed sites that were sampled monthly or bi-monthly. Sites were located on the Columbia Slough, Fanno Creek, Johnson Creek, Tryon Creek, and the Willamette River.

During the 2022–23 permit year, the City collected water quality samples from all of the instream water quality monitoring sites included in the 2022 Monitoring Plan (Table 3). As is required by Schedule B.2.d.i.A of the permit, over half of the samples were collected during the wet season (from September 1 to April 30).

Table 3: Summary of the instream water quality monitoring locations and the number of samples collected at each site during the permit year for both the probabilistic locations and fixed.

	Fixed Locations				Probabilistic Locations			
Watershed	**Number of Sites**	**Wet Weather Samples/ Site**	**Dry Weather Samples/ Site**	**Subtotal of Samples**	**Number of Sites**	**Wet Weather Samples/ Site**	**Dry Weather Samples/ Site**	**Subtotal of Samples**
Columbia Slough	2	4	2	12	5	1	4	25
Johnson Creek	2	4	2	12	6	1	4	30
Tualatin River	1	8	4	12	4	1	4-5	21
Willamette River Tributaries	2	8	4	24	5	1	4	25
Willamette River	3	8	4	36	N/A	N/A	N/A	N/A
Totals	**10**			**96**	**20**			**101**

2.3 Continuous Instream Monitoring

Continuous instream monitoring includes ongoing physical and chemical stream monitoring at fixed locations within streams that receive MS4 runoff. Continuous instream flow and temperature monitoring provides a high-resolution dataset that can be used to evaluate the physical characteristics of streams that receive MS4 discharges. The U.S. Geological Survey (USGS) operates eight stream gauges in the Portland area. The City provides partial funding for the monitoring sites through joint funding agreements.[1] All eight of the gauges record stream discharge, and five gauges also record water temperature. The Willamette gauge measures additional parameters, including chlorophyll-*a*, cyanobacteria, dissolved oxygen, nutrients, pH, specific conductance, and turbidity.

All eight stream gauges were operational throughout the permit year. Discharge data are missing during some periods at four of the gauges. Equipment failures resulting in an 8-day period at the Kelley Creek gauge (#14211499) at the end of May; several 2-3 day gaps at the Johnson Creek Sycamore gauge (#14211500) in January, March, and June; a week-long data gap at the Columbia Slough gauge (#14211820) in late-December; and several periods of missing data between January and April at the Willamette River gauge (#14211720). The USGS makes the instantaneous flow and temperature data available prior to the completion of its full data review process. A portion of the data presented here are provisional at the time of reporting and may be subject to change after the USGS completes the full quality assessment.

2.4 Macroinvertebrate Monitoring

Macroinvertebrate monitoring provides information on biological communities within waterbodies that receive MS4 discharges. The City collects benthic macroinvertebrate samples that are drawn from the same set of

[1] U.S. Department of the Interior, U.S. Geological Survey 2019 Joint Funding Agreement for Water Resource Investigations, https://efiles.portlandoregon.gov/Record/13152687.

rotating sampling locations where probabilistic instream monitoring is conducted. The approach focuses on collecting samples from wadeable perennial streams throughout the Portland area. Macroinvertebrate monitoring is timed to occur during the low-flow period to facilitate sampling and capture conditions during the period of highest stress for many organisms.

The City collected benthic macroinvertebrates at 15 perennial stream sites during the summer and early fall of 2022. All wadeable, riffle-dominated sites were sampled in accordance with the 2022 MS4 Monitoring Plan. No sampling problems were encountered.

2.5 Permit Year Precipitation Patterns

Precipitation patterns across Portland are variable, delivering different amounts of rain to different parts of the city. The City operates a network of rain gauges as part of the HYDRA Rainfall Network.[2] Each rain gauge records rainfall amounts in 0.01-inch increments. For the purposes of summarizing the precipitation patterns observed during the permit year, data from eight gauges located across the City were summarized (Figure 1). During the 2022–23 permit year, Portland received a total of approximately 40.1 inches of precipitation. During the previous 20 years, the eight rain gauges recorded a mean total annual rainfall amount of 37.8 inches.

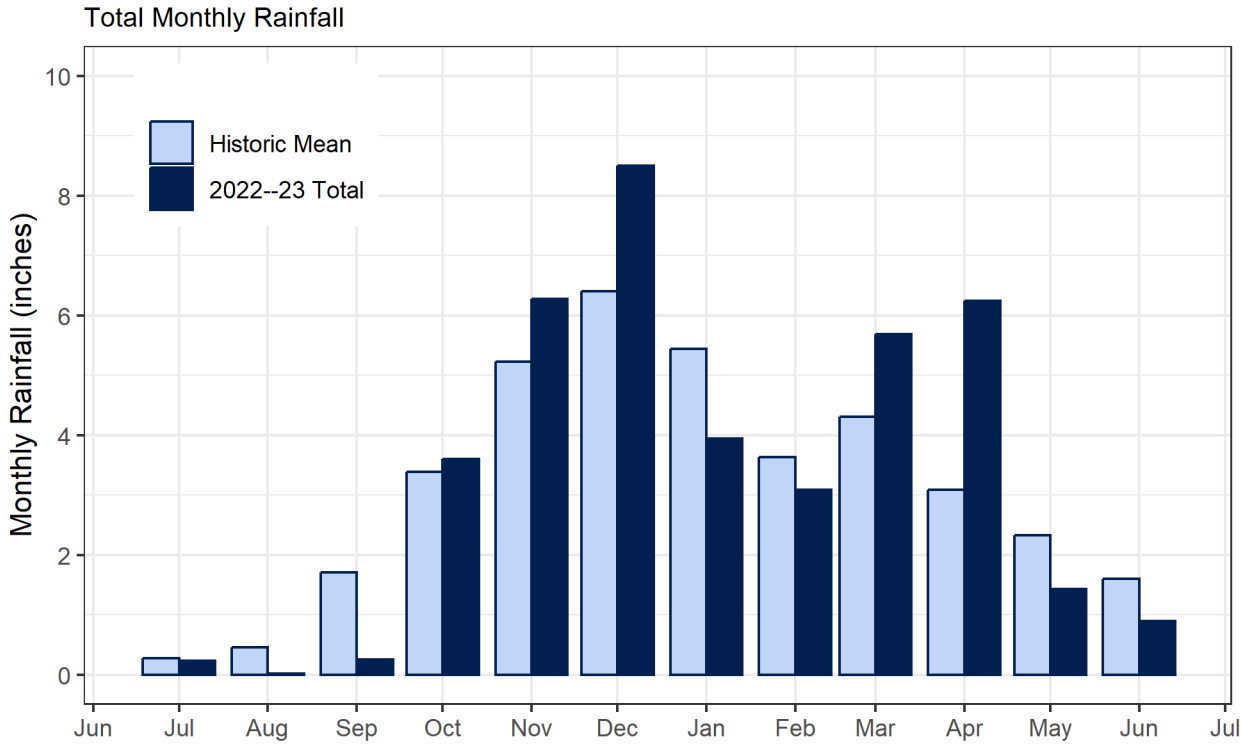

Figure 1: Mean total monthly rainfall recorded at eight stations across Portland from July 1, 2022, to June 30, 2023, compared to the mean monthly totals recorded from the previous 20 years (2002–2022).

Compared to previous years, Portland received more rain by approximately 2.3 inches during the 2022–23 permit year. Many months experienced higher than average rainfall amounts, with the largest deviations occurring in the winter and spring (Figure 1).

[2] More information about the HYDRA Rainfall Network is available here: https://or.water.usgs.gov/non-usgs/bes.

3 Monitoring Results

The following sections describe the results of the instream, stormwater, and biological monitoring conducted by the City during the 2022–23 permit year. Results are presented and summarized for each monitoring effort.

3.1 Stormwater Monitoring Results

The City collected three sets of stormwater grab samples during four separate events at each of the 15 stormwater outfall sites (Table 4) during the 2022–23 permit year. The water quality samples were analyzed for the full suite of required parameters.

Table 4: Summary of the stormwater outfall monitoring results from the permit year.

	Analyte	Mean	Median	Minimum	Maximum	Detections/ Samples
Field	Conductivity (umhos/cm)	83	72	24	376	45/45
	Dissolved oxygen (mg/L)	11.0	10.6	5.5	12.1	45/45
	Temperature (°C)	10.0	9.1	7.1	14.4	45/45
	pH (pH Units)	6.9	6.9	5.9	7.4	45/45
General	Alkalinity (mg $CaCO_3$/L)	22.0	21.5	7.6	54.9	45/45
	BOD (mg/L)	3.3	2.0	<2	24.0	22/45
	Dissolved organic carbon (mg/L)	4.5	3.8	2	10.2	45/45
	E. coli (MPN/100 mL)	1,500	400	<10	24,000	42/45
	Hardness (mg $CaCO_3$/L)	28.0	26.0	8.2	83.9	45/45
	Total suspended solids (mg/L)	22	8	<3	187	33/45
Metals (µg/L)	Copper	9.0	7.7	2	82.2	45/45
	Copper, dissolved	4.9	4.6	1.6	9.3	45/45
	Lead	4.00	0.49	<0.111	133.00	42/45
	Lead, dissolved	0.130	0.106	<0.106	0.521	13/45
	Mercury	0.0061	0.00384	0.00069	0.097	45/45
	Zinc	160.0	48.1	3	2,920	45/45
	Zinc, dissolved	130.0	35.0	2.9	2,970	45/45
Nutrients (mg/L)	Ammonia-nitrogen	0.054	0.036	<0.02	0.495	37/45
	Nitrate-nitrogen	0.75	0.52	<0.1	2.78	43/45
	Orthophosphate	0.06	0.06	0.024	0.16	45/45
	Total phosphorus	0.15	0.09	0.03	1.84	45/45

E. coli was regularly detected at all 15 of the stormwater outfalls. During the October 31, 2022, storm event, the sample collected at ACX758 had a high concentration of *E. coli* (24,000 MPN/100 mL; Table 4). Follow-up sampling was conducted at the site on November 8, 2023. The *E. coli* concentration had decreased to 640

MPN/100 mL. City staff examined the upstream basin draining to this outfall and did not observe any activities indicating illicit discharges.

Copper, mercury, and zinc were detected in all 45 stormwater samples. Total lead was detected at all 15 sites; however, dissolved lead was below detection in over 70% of the samples. The mean concentrations for all of the metals presented in Table 4 are higher than the median concentrations. This indicates that there are a small number of higher concentration results that increase the mean value, but do not occur frequently enough to increase the median concentrations. The probabilistic stormwater results were not compared to any water quality standards as no criteria apply directly to stormwater runoff.

The City analyzed stormwater grab samples for pesticides from one storm event during the 2022–23 permit year. All stormwater grab samples were collected from sites in the Tryon Creek watershed. Fifteen different pesticides were detected and at least one pesticide was detected at each outfall location (Table 5). The most commonly detected pesticide was Ethofumesate—detected at ten of the outfall locations. 2,4-D, Pentachlorophenol, and Triclopyr were also frequently detected—seen in data from at least half of the outfall locations (Table 5).

Table 5: Summary of the stormwater outfall monitoring results for pesticides from the permit year. Only the pesticides over the detection limit are presented.

Analyte (µg/L)	ACX590	ACX758	ACY093	ADC731	ADD086	ADG234	ADG766	ADJ873	ADJ884	ADK126	ADK154	ADK223	ADK505	ADM084	ANL865
2,4-D	0.0960	0.7500	0.110	0.1300		0.089			0.1485	1.1300		0.7450	0.36		
4,4'-DDE					0.0014										
alpha-BHC															0.0018
delta-BHC															0.0028
Dichlobenil		0.1500													
Diuron							0.0810					0.0700			
Endosulfan I	0.0120									0.0190					0.0053
Endrin									0.0049						
Ethofumesate	0.0930	0.0670		0.0850	0.0630	0.110		0.1300		0.1100	0.081	0.1100		0.0810	
gamma-BHC (Lindane)					0.0022		0.0027	0.0012	0.0028	0.0018				0.0018	
Glyphosate		16.0000													
Heptachlor								0.0014				0.0022			
Pentachlorophenol	0.1335	0.2123	0.221	0.0506	0.0431	0.133				0.1420					
trans-Chlordane				0.0016											
Triclopyr	0.1800	0.2300	0.390	0.1300	0.2100	0.080		0.2600					0.39		

Note: Only the detected pesticides are presented in the table above. The full suite of pesticides for which the stormwater samples were analyzed can be found in the 2022 MS4 Monitoring Plan.

3.2 Probabilistic Instream Monitoring Results

Throughout the 2022–23 permit year, the City collected 101 water quality grab samples across a range of flow and seasonal conditions from 20 probabilistically selected perennial stream sites. The water quality samples collected were analyzed for the full suite of required parameters. The results are summarized in Table 6, including observed exceedances for parameters with associated water quality criteria or TMDL limits.

Table 6: Summary of the probabilistic instream monitoring results from the permit year.

	Analyte	Watershed	Median	Range	Detections/ Samples	% above Water Quality Criteria/ TMDL Limit
	Dissolved oxygen (mg/L)	Columbia Slough	10.9	0.9–17.6	25/25	16
		Johnson Creek	10.7	5.8–12.5	30/30	3
		Tualatin River	9.8	7.7–12.3	21/21	0
		Willamette tributaries	10.5	7.9–12.4	25/25	0
	pH (pH units)	Columbia Slough	7.1	6.3–8.1	25/25	8
		Johnson Creek	7.0	6.1–7.8	30/30	7
		Tualatin River	7.2	6.5–7.8	21/21	0
		Willamette tributaries	7.5	6.2–7.9	25/25	4
	BOD (mg/L)	Columbia Slough	2	<2–7	11/25	
	E. coli (MPN/100 mL)	Columbia Slough	52	<10–680	22/25	4
		Johnson Creek	210	31–1100	30/30	23
		Tualatin River	110	<10–5200	21/21	29
		Willamette tributaries	120	<10–2000	23/25	24
	Total suspended solids (mg/L)	Columbia Slough	8	<3–43	20/25	
		Johnson Creek	4	<3–255	20/30	
		Tualatin River	8	<3–211	17/21	
		Willamette tributaries	4	<3–692	15/25	
Metals (µg/L)	Copper	Columbia Slough	1.29	0.48–4.93	25/25	
		Johnson Creek	1.36	0.69–10.5	30/30	
		Tualatin River	2.29	0.67–12.6	21/21	
		Willamette tributaries	1.61	0.64–31.6	25/25	
	Copper, dissolved	Columbia Slough	0.543	<0.211–2.17	24/25	0
		Johnson Creek	0.883	0.39–1.87	30/30	7
		Tualatin River	0.957	0.36–3.78	21/21	10
		Willamette tributaries	0.802	0.56–6.51	25/25	0
	Lead	Columbia Slough	0.348	0.11–2.45	21/25	
		Johnson Creek	0.255	0.11–6.61	29/30	
		Tualatin River	0.387	0.15–11.7	21/21	
		Willamette tributaries	0.284	0.11–25	22/25	
	Lead, dissolved	Columbia Slough	0.106	<0.106–0.106	0/25	0
		Johnson Creek	0.106	<0.106–0.126	1/30	0
		Tualatin River	0.106	<0.106–0.231	4/21	0
		Willamette tributaries	0.106	<0.106–0.273	7/25	0

	Analyte	Watershed	Median	Range	Detections/ Samples	% above Water Quality Criteria/ TMDL Limit
	Mercury	Columbia Slough	0.00167	0.0011–0.00667	11/25	0
		Johnson Creek	0.00178	0.0014–0.0199	18/30	10
		Tualatin River	0.00167	<0.00111–0.0252	11/21	14
		Willamette tributaries	0.00167	0.0011–0.0481	13/25	12
	Zinc	Columbia Slough	4.0	0.8–21.7	25/25	
		Johnson Creek	5.7	1–71.4	30/30	
		Tualatin River	14.2	3.2–101	21/21	
		Willamette tributaries	9.5	0.56–231	25/25	
	Zinc, dissolved	Columbia Slough	1.77	<0.529–5.05	21/25	0
		Johnson Creek	3.12	0.56–10.4	30/30	0
		Tualatin River	5.31	1–17.3	21/21	0
		Willamette tributaries	5.31	<0.529–54	24/25	4
Nutrients (mg/L)	Ammonia-nitrogen	Columbia Slough	0.063	<0.02–0.362	23/25	0
		Johnson Creek	0.022	<0.02–0.084	19/30	0
		Tualatin River	0.054	<0.02–0.407	19/21	0
		Willamette tributaries	0.020	<0.02–0.43	12/25	0
	Nitrate-nitrogen	Columbia Slough	0.83	<0.1–3.12	23/25	
		Johnson Creek	0.71	<0.1–2.21	29/30	
		Tualatin River	0.66	0.14–1.61	21/21	
		Willamette tributaries	0.70	0.28–3.20	25/25	
	Ortho-phosphate	Columbia Slough	0.033	<0.02–0.208	22/25	
		Johnson Creek	0.035	<0.02–0.064	23/30	
		Tualatin River	0.053	0.026–0.157	21/21	
		Willamette tributaries	0.067	<0.02–0.171	24/25	
	Total phosphorus	Columbia Slough	0.126	0.065–0.439	25/25	24
		Johnson Creek	0.063	0.022–0.320	30/30	10
		Tualatin River	0.106	0.039–0.493	21/21	43
		Willamette tributaries	0.086	0.030–0.956	25/25	16

Table Notes:

(1) The water quality criterion for dissolved copper is calculated using the Biotic Ligand Model. The chronic dissolved copper criterion ranged from 0.33 to 24.06 µg/L, with a mean of 4.76 µg/L.

(2) The water quality criteria for dissolved lead and dissolved zinc are based on the hardness in the water column. The chronic dissolved lead criterion ranged from 0.52 to 3.4 µg/L, with a mean of 1.63 µg/L. The chronic dissolved zinc criterion ranged from 35.51 to 149.47 µg/L, with a mean of 82.94 µg/L.

(3) There are no instream freshwater water quality criteria for total phosphorus in Oregon; however, some TMDLs include load allocations for phosphorus that vary by watershed. Samples from sites in the Tualatin watershed were evaluated and compared to the appropriate TMDL limit, and all other sites were evaluated against the 0.155 mg/L maximum instream concentration from the Columbia Slough TMDL.

3.2.1 Dissolved Oxygen

For waterbodies identified by DEQ as supporting cold-water aquatic life, the 30-day mean minimum dissolved oxygen concentration may not be less than 8.0 mg/L, and the absolute minimum concentration may not drop below 6.0 mg/L (OAR 340-041-0016 – Table 21). All of the probabilistic streams have been designated by DEQ as waterbodies that support cold-water aquatic life. Concentrations of dissolved oxygen below the absolute minimum of 6.0 mg/L were observed most frequently during the growing season in the Columbia Slough. Concentrations below the criterion were also observed in Johnson Creek during the summer.

3.2.2 pH

The numeric pH criteria for freshwater waterbodies in the Willamette Basin specifies that pH values may not fall outside the range of 6.5 to 8.5 (OAR 340-041-0345 (1)(b)). No exceedances of the upper limit were observed; however, pH values below 6.5 were measured in all watersheds except for the Tualatin River. While observed, these low pH readings were not common.

3.2.3 E. coli

E. coli is used by DEQ as an indicator of human pathogens to protect recreational contact. The numeric bacteria criteria include two limits for freshwater contact: (1) a 90-day geometric mean of 126 *E. coli* organisms per 100 mL and (2) no single sample may exceed 406 *E. coli* organisms per 100 mL. The City's instream sampling program does not collect samples at a sufficient frequency to evaluate exceedances of the first criteria. As such, all of the instream *E. coli* samples were evaluated against the concentration of 406 organisms per 100 mL. Exceedances of the single sample maximum were observed in all watersheds but were substantially less common in the Columbia Slough. The higher *E. coli* concentrations were primarily observed under wet weather conditions.

3.2.4 Metals

The aquatic life water quality criteria for toxic pollutants (OAR 340-041-8033 – Table 30) includes acute and chronic criteria for dissolved copper, lead, and zinc. The water criteria for mercury are based on the total fraction of the metal. For each of the metals, the acute criterion is applied as a 1-hour average concentration, and the chronic criterion is applied as a 96-hour average concentration. Neither the acute nor chronic criteria may be exceeded more than once every 3 years. The results presented in Table 6 include the frequency that the samples exceed the applicable chronic criteria. There is not a sufficient number of samples available to calculate a 96-hour average concentration, and as such, the exceedances of the chronic criteria presented in Table 6 are based on an evaluation of each individual sample.

Median concentrations of metals did not vary substantially between watersheds; however, concentrations were typically lowest in the Columbia Slough and highest in the Tualatin River streams. Both total and dissolved copper and zinc were detected in almost all of the surface water samples; however, exceedances of the chronic water quality criteria were not frequently observed. The few exceedances that were observed occurred during the wet season. The chronic and acute water quality criteria for dissolved copper are calculated using the Biotic Ligand Model and are based on the concentration of ions, alkalinity, organic carbon, pH, and temperature of the sample. The chronic water quality criteria for dissolved lead and dissolved zinc are based on hardness in the water column. Each water quality sample is analyzed for hardness in order to calculate the appropriate water quality criterion for the sample. As such, a different calculated criterion for each metal applies to each water quality sample. No exceedances of the chronic dissolved lead criterion were observed.

Mercury was detected in approximately half of the surface water samples and did not differ substantially between watersheds. The aquatic life criteria for mercury include a chronic criterion of 0.012 µg/L (OAR 340-041-8033 – Table 30). Exceedances of the chronic mercury criterion were observed in all watersheds except for the Columbia Slough.

3.2.5 Nutrients

The toxicity of ammonia to aquatic organisms and the corresponding water quality criteria are dependent on the pH and temperature of the waterbody, as well as the life stage of the organism (OAR 340-041-8033 – Table 30). The chronic ammonia criterion is expressed as a 30-day rolling average. No exceedances of the chronic ammonia criterion were observed in any of the watersheds.

No state-wide water quality criteria have been established for phosphorus; however, DEQ has established TMDLs for total phosphorus in the Columbia Slough (0.155 mg/L) and Tualatin (0.13 mg/L for Fanno Creek) basins. Values over the corresponding TMDL limits were observed in all of the watersheds, with a larger portion of the samples over the limit in both the Columbia Slough and Tualatin River watersheds.

3.3 Fixed Instream Monitoring Results

Throughout the 2022–23 permit year, the City collected 96 water quality grab samples across a range of flow and seasonal conditions from 10 fixed perennial stream sites. The water quality samples collected were analyzed for the full suite of required parameters. The results are summarized in Table 7 including observed exceedances for parameters with associated water quality criteria or TMDL limits.

Table 7: Summary of the fixed instream monitoring results from the permit year.

Analyte	Watershed	Median	Range	Detections/ Samples	% above Water Quality Criteria/ TMDL Limit
Dissolved oxygen (mg/L)	Columbia Slough	9	1.2–22.4	12/12	17
	Johnson Creek	10.95	8.4–13.5	12/12	0
	Tualatin River	10.2	5.5–12.4	12/12	17
	Willamette mainstem	11.55	8.1–13.9	36/36	0
	Willamette tributaries	10.6	4.9–13.1	26/26	4
pH (pH units)	Columbia Slough	6.7	6.4–9.1	12/12	17
	Johnson Creek	7.15	6.3–7.8	12/12	8
	Tualatin River	7.6	7.2–7.9	12/12	0
	Willamette mainstem	7.15	6–7.4	36/36	8
	Willamette tributaries	7.7	6.8–8.3	26/26	0
BOD (mg/L)	Columbia Slough	2	<2–10	5/12	
E. coli (MPN/100 mL)	Columbia Slough	97.5	20–540	12/12	8
	Johnson Creek	260	120–560	11/12	36
	Tualatin River	320	<10–1100	13/12	38
	Willamette mainstem	16	3–990	36/36	8
	Willamette tributaries	230	<10–6500	26/29	38
Total suspended solids (mg/L)	Columbia Slough	17.5	<3–45	11/12	
	Johnson Creek	4.5	<3–8	7/12	
	Tualatin River	3	<3–10	7/12	
	Willamette mainstem	5	<3–18	29/36	
	Willamette tributaries	3	<3–14	4/26	

	Analyte	Watershed	Median	Range	Detections/ Samples	% above Water Quality Criteria/ TMDL Limit
Metals (µg/L)	Copper	Columbia Slough	2.08	0.54–3.44	12/12	
		Johnson Creek	1.365	0.73–3.65	12/12	
		Tualatin River	1.805	0.93–3.4	12/12	
		Willamette mainstem	0.764	0.46–2.5	36/36	
		Willamette tributaries	1.95	0.74–13.9	26/26	
	Copper, dissolved	Columbia Slough	0.8195	0.28–1.29	12/12	8
		Johnson Creek	0.8105	0.43–1.83	12/12	8
		Tualatin River	1.215	0.74–2.3	12/12	0
		Willamette mainstem	0.4065	0.24–0.766	36/36	6
		Willamette tributaries	1.37	0.6–11.7	26/26	0
	Lead	Columbia Slough	0.9355	<0.111–1.61	11/12	
		Johnson Creek	0.306	<0.111–0.502	11/12	
		Tualatin River	0.5105	0.3–1.17	12/12	
		Willamette mainstem	0.1035	0.052–0.355	36/36	
		Willamette tributaries	0.364	<0.111–1.21	24/26	
	Lead, dissolved	Columbia Slough	0.106	<0.106–0.152	1/12	0
		Johnson Creek	0.106	<0.106–0.106	0/12	0
		Tualatin River	0.109	<0.106–0.282	6/12	0
		Willamette mainstem	0.021	<0.021–0.038	14/36	0
		Willamette tributaries	0.106	<0.106–0.254	10/26	0
	Mercury	Columbia Slough	0.00269	<0.00111–0.00488	8/12	0
		Johnson Creek	0.00205	0.0012–0.00301	9/12	0
		Tualatin River	0.00183	<0.00111–0.00371	7/12	0
		Willamette mainstem	0.00167	<0.00111–0.00251	6/36	0
		Willamette tributaries	0.00167	<0.00111–0.00413	13/26	0
	Zinc	Columbia Slough	7.215	0.86–16.9	12/12	
		Johnson Creek	4.55	1.7–9.21	12/12	
		Tualatin River	15.2	5.3–21.6	12/12	
		Willamette mainstem	1.265	0.76–3.61	36/36	
		Willamette tributaries	20.2	4.3–164	26/26	
	Zinc, dissolved	Columbia Slough	1.765	<0.529–9.11	10/12	0
		Johnson Creek	2.91	0.64–4.99	12/12	0
		Tualatin River	10.8	2.3–15.3	12/12	0
		Willamette mainstem	0.6455	<0.529–1.2	23/36	0
		Willamette tributaries	15.15	3–150	26/26	8
Nutrients (mg/L)	Ammonia-nitrogen	Columbia Slough	0.0785	0.021–0.318	12/12	0
		Johnson Creek	0.025	<0.02–0.055	8/12	0
		Tualatin River	0.0275	<0.02–0.054	8/12	0
		Willamette mainstem	0.077	0.028–0.104	36/36	0
		Willamette tributaries	0.026	<0.02–0.287	17/26	0
	Nitrate-nitrogen	Columbia Slough	0.775	<0.1–1.8	10/12	
		Johnson Creek	2.06	0.26–2.95	12/12	
		Tualatin River	0.575	<0.1–1.31	11/12	
		Willamette mainstem	0.37	0.27–1.46	36/36	
		Willamette tributaries	1.085	0.36–1.85	26/26	

	Analyte	Watershed	Median	Range	Detections/ Samples	% above Water Quality Criteria/ TMDL Limit
	Ortho-phosphate	Columbia Slough	0.0425	0.021–0.141	12/12	
		Johnson Creek	0.041	<0.02–0.085	11/12	
		Tualatin River	0.062	0.028–0.112	12/12	
		Willamette mainstem	0.0375	<0.02–0.084	35/36	
		Willamette tributaries	0.0655	0.028–0.123	26/26	
	Total phosphorus	Columbia Slough	0.102	0.061–0.159	12/12	8
		Johnson Creek	0.06	0.033–0.105	12/12	0
		Tualatin River	0.0975	0.059–0.176	12/12	42
		Willamette mainstem	0.055	0.03–0.074	36/36	0
		Willamette tributaries	0.0825	0.047–0.174	26/26	8

Table Notes:

(1) The water quality criterion for dissolved copper is calculated using the Biotic Ligand Model. The chronic dissolved copper criterion ranged from 0.28 to 58.14 µg/L, with a mean of 5.81 µg/L.

(2) The water quality criteria for dissolved lead and dissolved zinc are based on the hardness in the water column. The chronic dissolved lead criterion ranged from 0.43 to 2.63 µg/L, with a mean of 1.2 µg/L. The chronic dissolved zinc criterion ranged from 30.85 to 122.13 µg/L, with a mean of 65.24 µg/L.

(3) There are no instream freshwater water quality criteria for total phosphorus in Oregon; however, some TMDLs include load allocations for phosphorus that vary by watershed. Samples from sites in the Tualatin watershed were evaluated and compared to the appropriate TMDL limit, and all other sites were evaluated against the 0.155 mg/L maximum instream concentration from the Columbia Slough TMDL.

3.3.1 Dissolved Oxygen

All of the fixed stream sites support cold-water aquatic life. Concentrations of dissolved oxygen below the absolute minimum of 6.0 mg/L were observed at sites in the Columbia Slough, Tualatin River, and Willamette tributaries. No concentrations below the minimum criterion were observed in Johnson Creek or the mainstem Willamette River.

3.3.2 pH

One exceedance of the upper pH limit of 8.5 was observed in the Columbia Slough. pH values below 6.5 were measured in the Columbia Slough, Johnson Creek, and mainstem Willamette River. While observed, these low pH readings were not common.

3.3.3 E. coli

All of the fixed instream *E. coli* samples were evaluated against the single sample concentration of 406 organisms per 100 mL. Exceedances of the single sample maximum were observed in all watersheds but were substantially less common in the Columbia Slough and mainstem Willamette River. The higher *E. coli* concentrations were primarily observed under wet weather conditions.

3.3.4 Metals

Median concentrations of metals did not vary substantially between watersheds; however, concentrations were typically lowest in the mainstem Willamette River, with the highest concentrations frequently seen in the Tualatin River and Willamette tributary streams. Both total and dissolved copper and zinc were detected in almost all of the surface water samples; however, exceedances of the chronic water quality criteria were rarely

observed. The few exceedances that were observed occurred during the wet season. No exceedances of the chronic dissolved lead criterion were observed.

Mercury was detected in approximately half of the surface water samples, with the exception of the mainstem Willamette River where mercury was detected in approximately 20% of the samples. Outside of the Willamette mainstem, concentrations did not differ substantially between watersheds. No exceedances of the chronic mercury criterion were observed.

3.3.5 Nutrients

No exceedances of the chronic ammonia criterion were observed in any of the watersheds. Values over the corresponding TMDL limits were primarily observed in Tualatin River watershed.

3.4 Continuous Instream Monitoring Results

Stream discharge was recorded at the eight USGS stream gauges in the Portland area. Water temperature was recorded at five of the eight gauges. The following sections present the results from the 2022–23 permit year.

3.4.1 Instream Flow

The effect of precipitation patterns during the permit year was observed in the stream discharge recorded at the USGS gauges within the city. The effects of the wetter than usual December and spring (Figure 1) can be seen in the instream flow recorded at the five tributary gauges. Flows in Fanno Creek rose above the historic 90th percentile high flow discharge in the spring, as did flows in Tryon Creek (Figure 2).

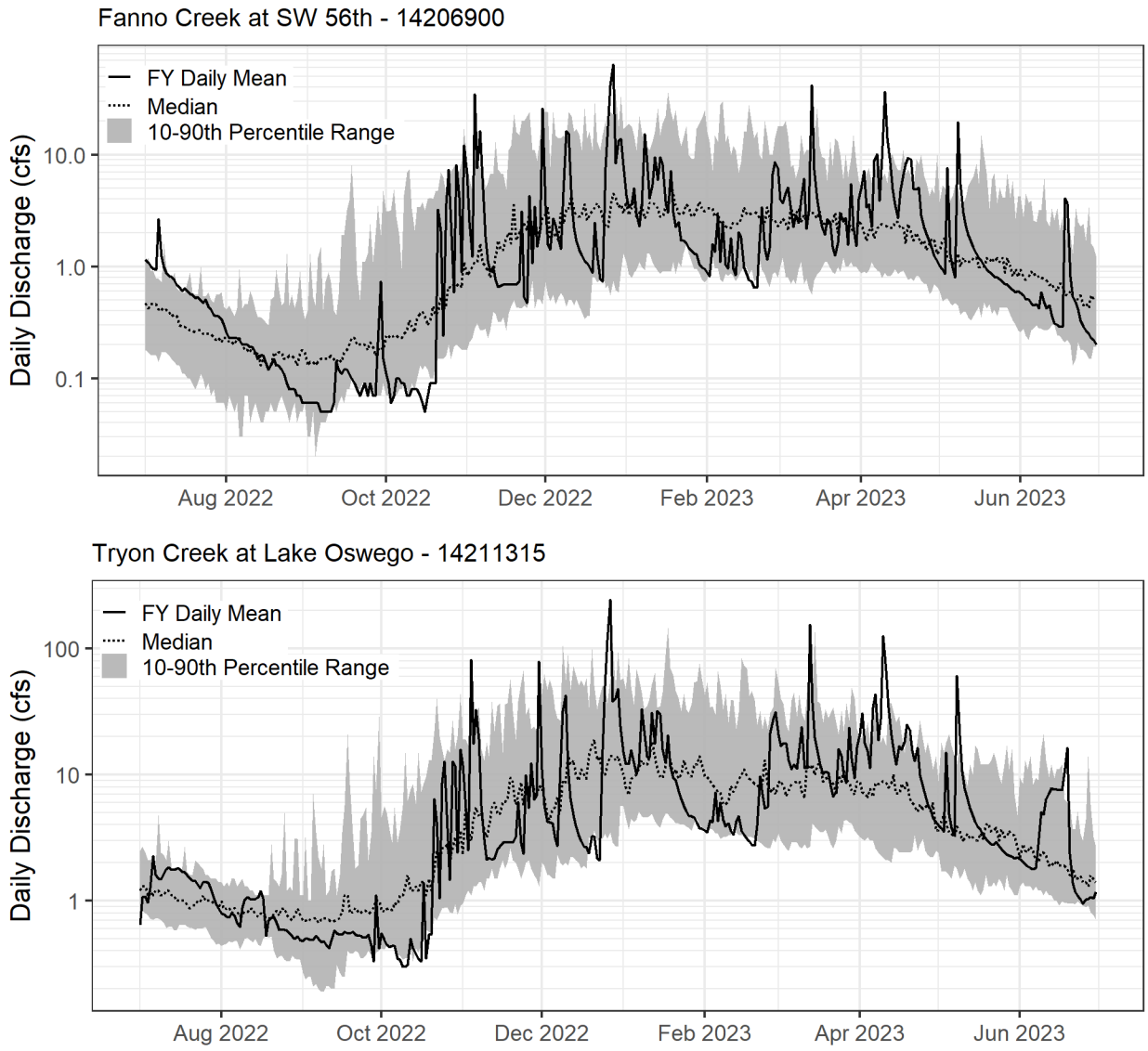

Figure 2: Daily discharge recorded at westside USGS gauges #14206900 (Fanno) and #14211315 (Tryon) during the permit year. The mean daily discharge (solid line) is plotted along with the historic median (dotted line) and 10th to 90th percentile range (grey area) of observed flows from the available period of record (29 and 18 years, respectively).

Flows in the Johnson Creek watershed also responded to the precipitation patterns observed during the permit year. Kelley and Johnson Creek discharges decreased during the period of dry weather in January and February, approaching or dipping below the 10th percentile low flows (Figure 3). Low flows in the summer remained within or close to the historic 10th to 90th percentile range at all three sites, with the mainstem Johnson Creek flows close to their historic median flows.

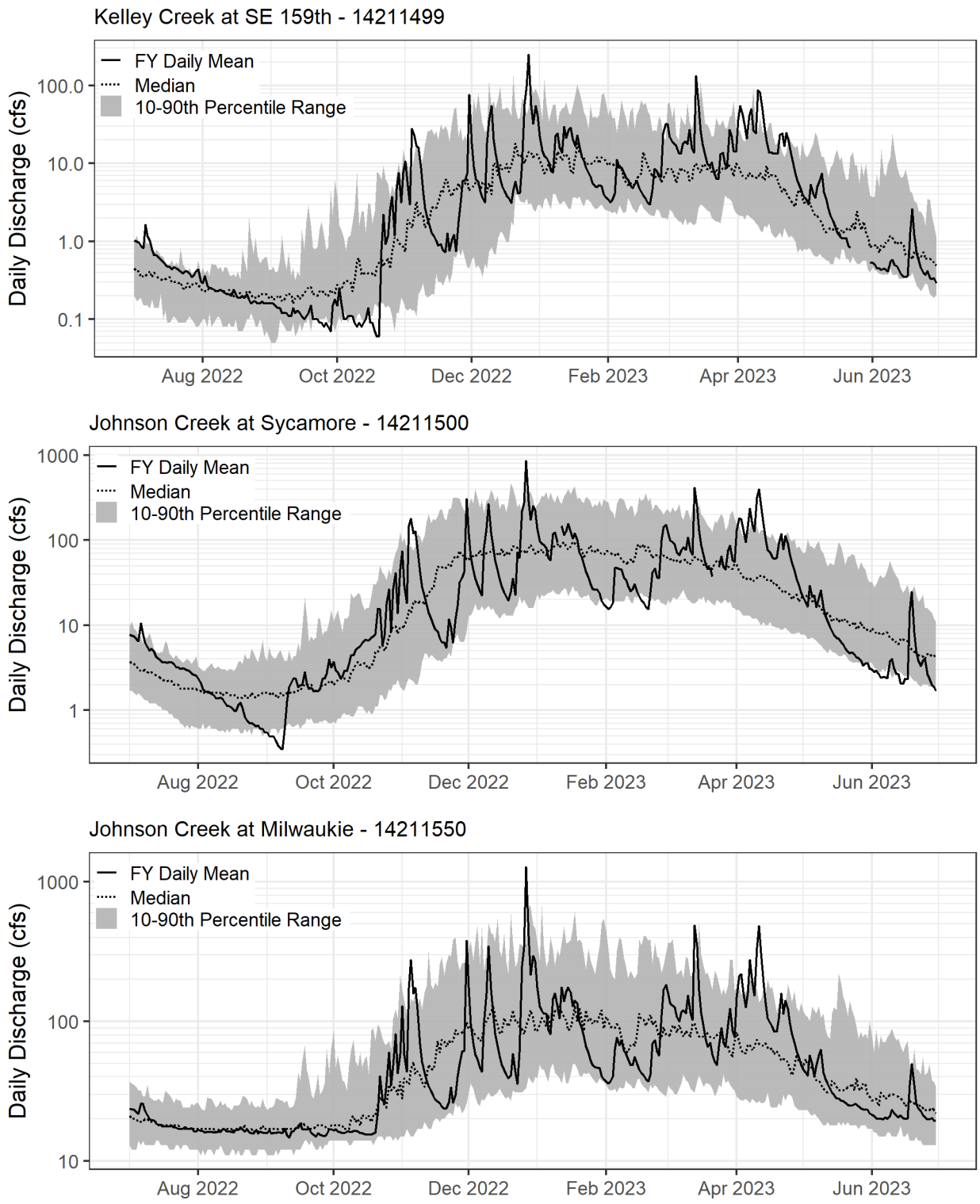

Figure 3: Daily discharge recorded at three eastside USGS gauges (#14211499, #14211500, and #14211550) during the permit year. The mean daily discharge (solid line) is plotted along with the historic median (dotted line) and 10th–90th percentile range (grey area) of observed flows from the available period of record (19, 79, and 30 years, respectively).

The Columbia Slough is tidally influenced, and negative flows are routinely observed as a result of the tidal fluctuations. The substantial negative and positive flows in May (Figure 4) correspond to the period of elevated discharge in the Columbia River during the spring.

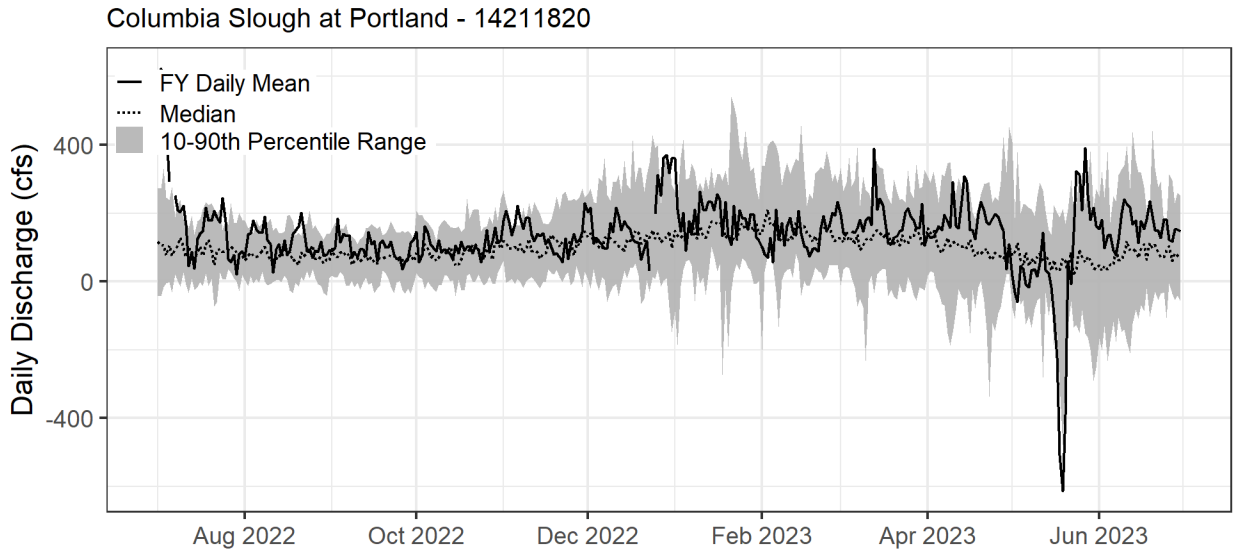

Figure 4: Columbia Slough daily discharge recorded at USGS gauge #14211820 during the permit year. The mean daily discharge (solid line) is plotted along with the historic median (dotted line) and 10th–90th percentile range (grey area) of observed flows from the available 31-year period of record. The Columbia Slough is tidally influenced, and the data presented have not been corrected.

Willamette River flows at Portland were lower than the historic median values and were often close to or below the 10th percentile during periods of the permit year (Figure 5)—particularly in the late-winter/early spring. As seen at the other sites, an increase in Willamette River flows corresponded with the increase in precipitation in December and April. The mean daily discharge peaked at 120,000 cubic feet per second on December 29.

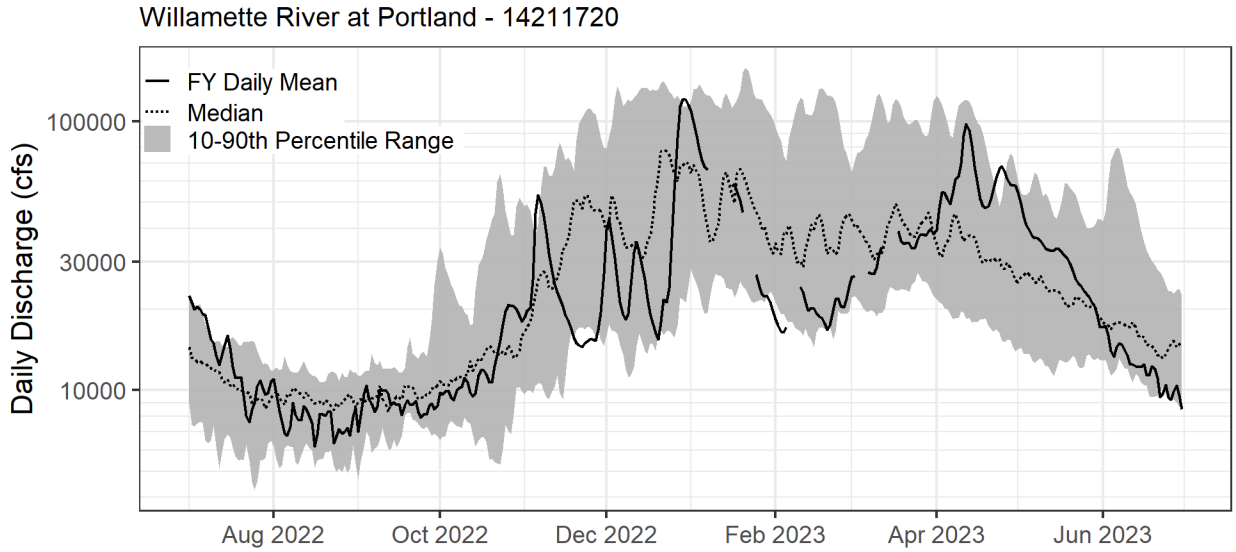

Figure 5: Willamette daily discharge at Portland recorded at USGS gauge #14211720 during the permit year. The mean daily discharge (solid line) is plotted along with the historic median (dotted line) and 10th to 90th percentile range (grey area) of observed flows from the available 14-year period of record (2007 to present). Discharge values have been corrected for tidal influences by USGS using the 2011 method for Processing and Publication of Discharge and Stage Data Collected in Tidally-Influenced Areas.[3] Unfiltered discharge values are available from 1988 to present.

3.4.2 Temperature

Johnson Creek water temperatures at the Sycamore gauge exceeded the 7-day average daily maximum (7DADM) temperature criterion for rearing and migration (18°C) from July 1 to mid-September in 2022 (Figure 6). In 2023, water temperatures began exceeding the rearing and migration criterion in mid-May. Water temperatures at the Sycamore gauge exceeded the spawning criterion in May during the 2022–23 permit year.

Johnson Creek water temperatures at the Milwaukie gauge followed a similar pattern to those recorded at the upstream Sycamore gauge. Summer temperatures exceeded the 7DADM temperature criterion for rearing and migration (18°C) from July 1 to mid-September in 2022 (Figure 6). Water temperatures exceeded the spawning temperature criterion briefly in the fall. As with the Sycamore gauge, water temperatures began increasing in April and exceeded the spawning criterion in May. In 2023, water temperatures began exceeding the rearing and migration criterion in mid-May.

[3] The 2011 USGS methodology is available at: https://water.usgs.gov/admin/memo/SW/sw10.08-final_tidal_policy_memo.pdf.

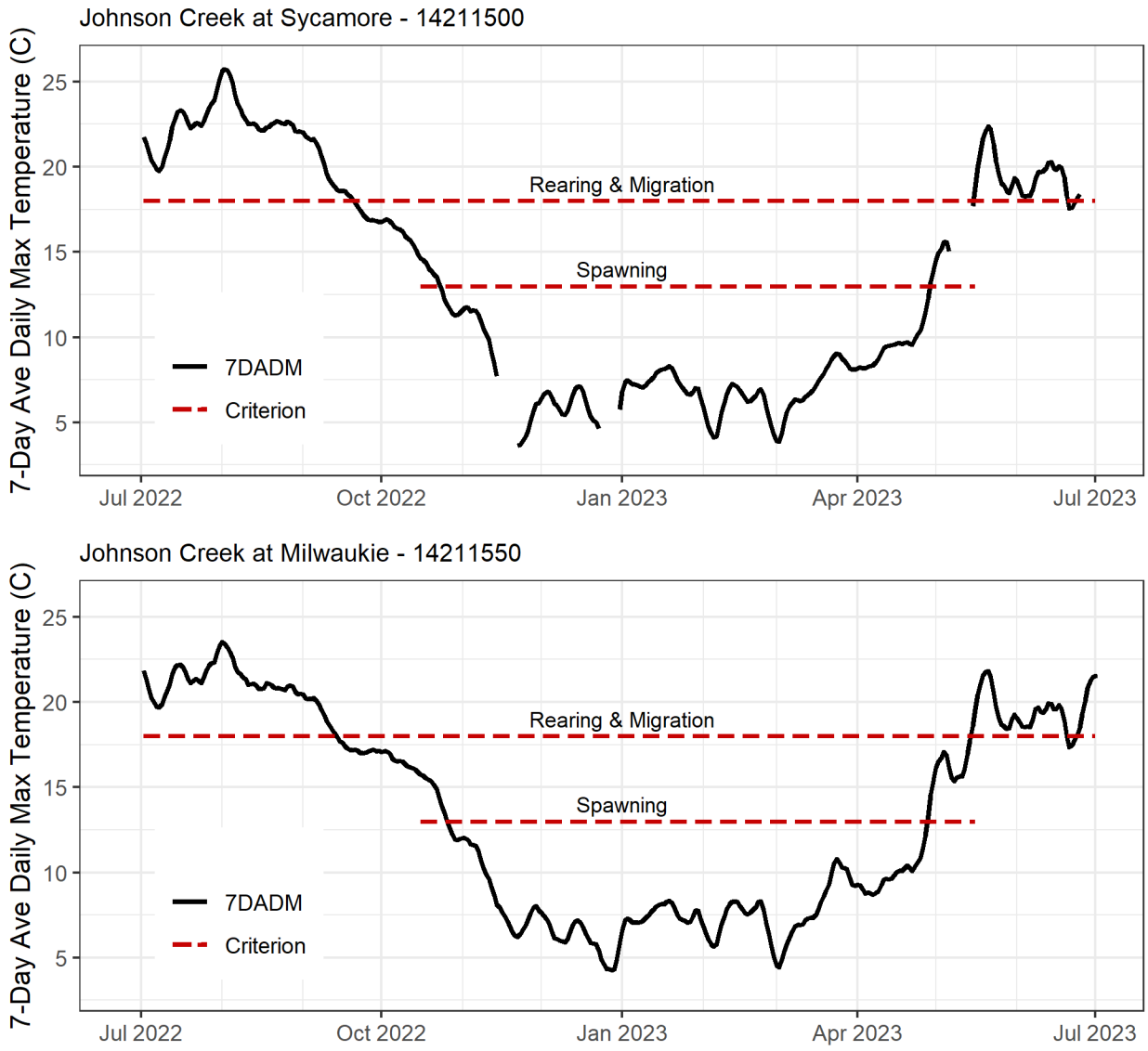

Figure 6: Seven-day average daily maximum mainstem Johnson Creek water temperatures recorded at USGS gauge #14211500 at Sycamore and USGS gauge #14211550 at Milwaukie during the permit year. The dashed red lines represent the applicable temperature criteria for salmonid spawning (13°C) and rearing and migration (18°C).

Consistent with the two other Johnson Creek gauges, summertime temperatures in Kelley Creek remained above the rearing criterion throughout most of Summer 2022 until September. Kelley Creek water temperatures remained below the spawning criterion throughout the fall and winter but exceeded it in May. While water temperatures in Kelley Creek followed a similar warming pattern to that recorded by the two Johnson Creek gauges in May 2023, the increase resulted only in temperatures higher than the rearing criterion for a short period in May and the end of June.

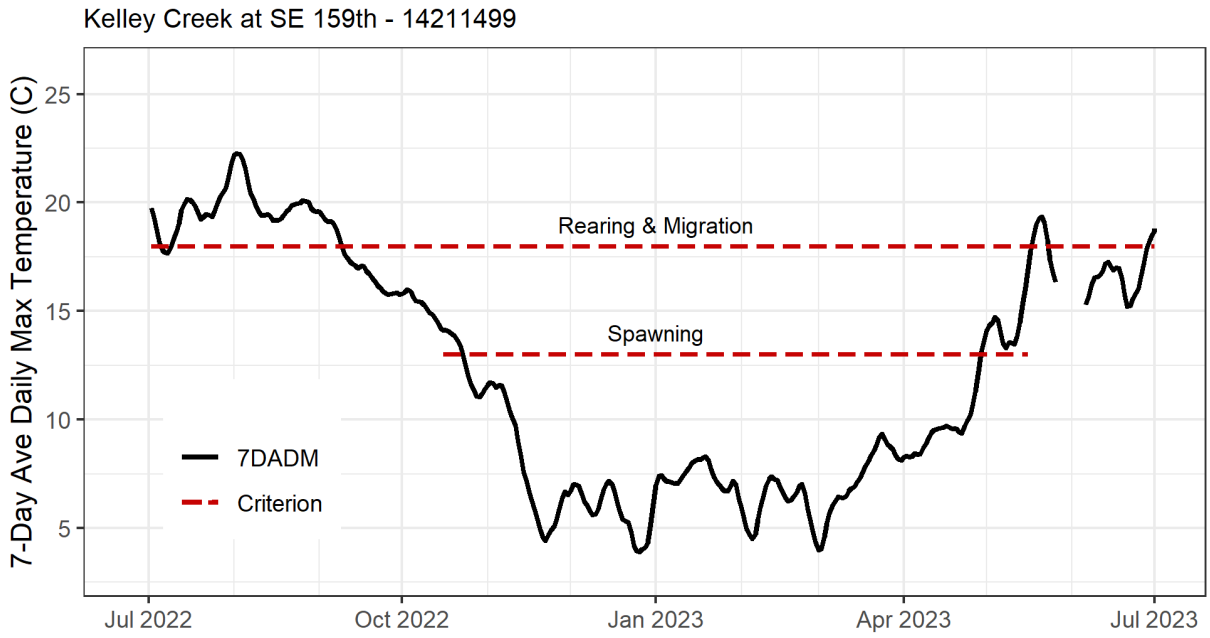

Figure 7: Seven-day average daily maximum Kelley Creek water temperatures recorded at USGS gauge #14211499 at SE 159th Avenue during the permit year. The dashed red lines represent the applicable temperature criteria for salmonid spawning (13°C) and rearing and migration (18°C).

Water temperatures recorded at the Crystal Springs Creek gauge also followed a similar pattern (Figure 8). Temperatures remained above the rearing criterion until mid-September of 2022. Water temperatures began increasing in mid-March and exceeded the spawning criterion for the remainder of the spring. Due to equipment issues, water temperature was not recorded at the site from mid-October to the end of January.

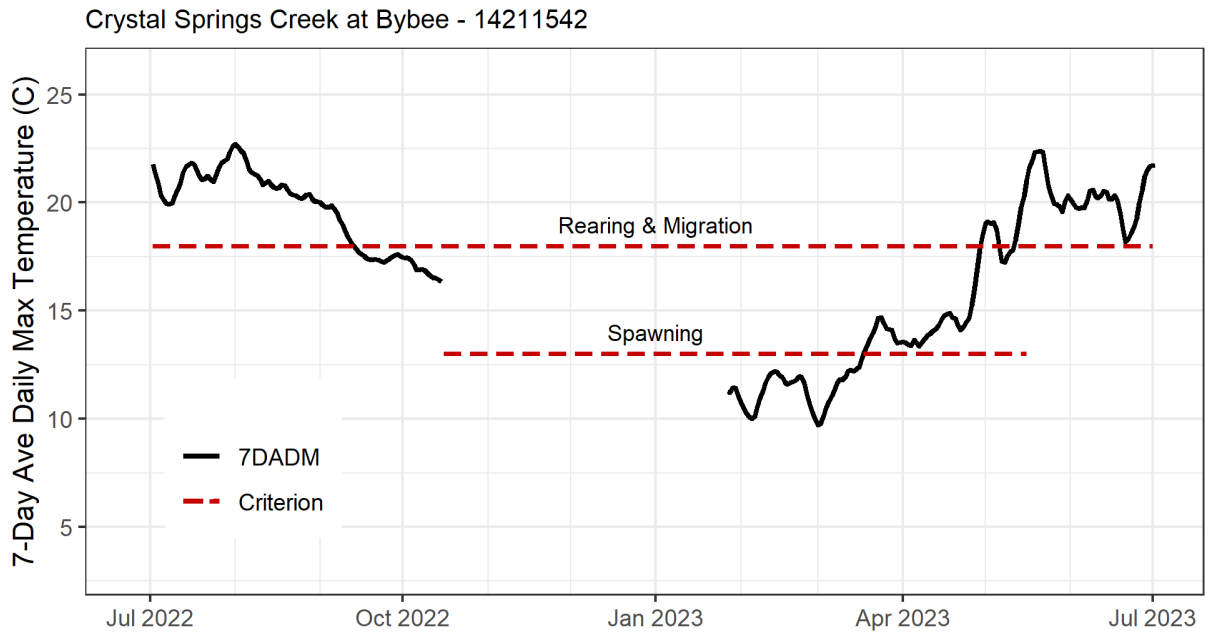

Figure 8: Seven-day average daily maximum Crystal Springs Creek water temperatures recorded at USGS gauge #14211542 at SE Bybee Street during the permit year. The dashed red lines represent the applicable temperature criteria for salmonid spawning (13°C) and rearing and migration (18°C).

Unlike Crystal Springs and Johnson and Kelley creeks, the Willamette River in Portland is designated as a migration corridor for salmon and steelhead with no rearing or spawning uses. As such, a single temperature criterion applies for the entire year (20°C). Willamette River water temperatures exceeded the migration corridor temperature limit from mid-July to mid-September in 2022 (Figure 9). Temperatures declined quickly in the fall and remained below the temperature criterion until the last week of June.

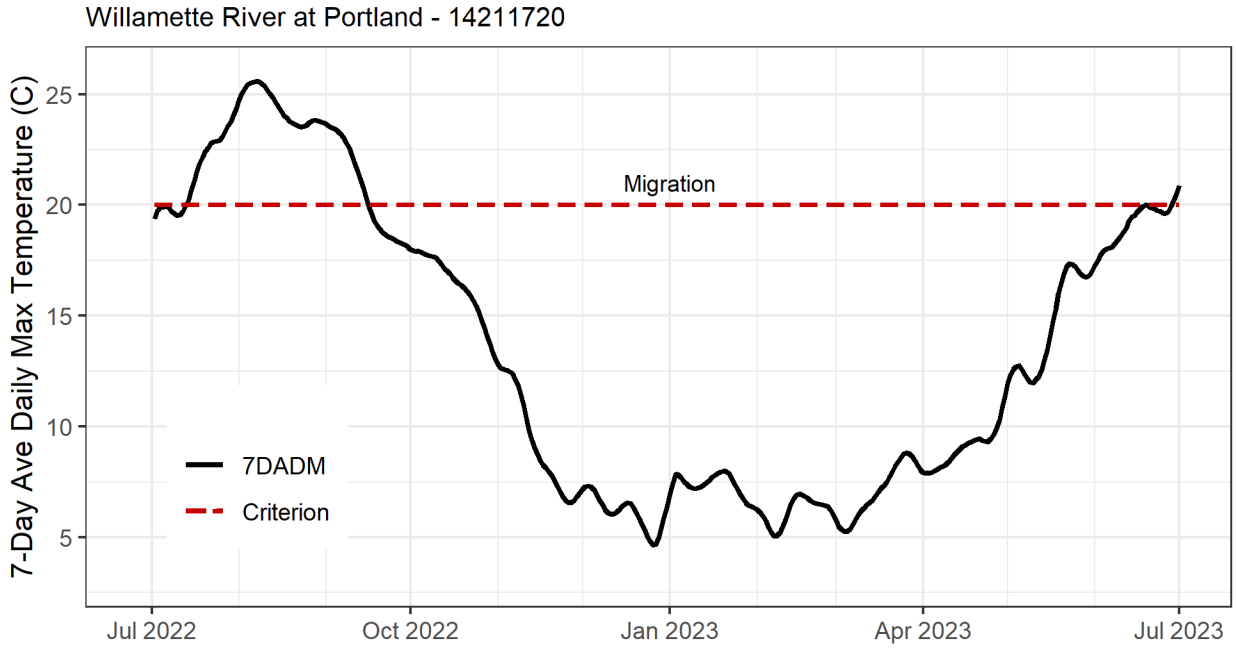

Figure 9: Seven-day average daily maximum Willamette River water temperatures recorded at USGS gauge #14211720 at the Morrison Bridge during the permit year. The dashed red line represents the applicable temperature criterion for salmonid migration (20°C).

3.5 Macroinvertebrate Monitoring Results

Aquatic macroinvertebrate samples were collected at 15 perennial sites during the 2022–23 permit year. Samples are not collected from stream sites in the Columbia Slough as these sites are not riffle-dominated wadeable systems. As described in Section 2.2, the probabilistic instream sampling is based on four rotating panels, with 20 perennial sites included in each panel. Each 4-year cycle includes the same 80 perennial monitoring sites. The macroinvertebrate results from prior sampling cycles are included in Table 8.

DEQ uses the PREDATOR model to evaluate the condition of macroinvertebrate communities. The PREDATOR model was developed by DEQ and can be used to evaluate the observed macroinvertebrate community compared to the expected macroinvertebrate community.[4] The model uses reference and site conditions to predict the expected community characteristics in the absence of human influences. The ratio between the sampled macroinvertebrate (observed) score to the predicted macroinvertebrate (expected) score provides an estimate of the level of impact. The PREDATOR model includes benchmarks to describe the biological conditions of a sample that are based on the distribution of Observed/Expected (O/E) ratios from reference sites. The

[4] Hubler, S. (2008). *PREDATOR: Development and use of RIVPACS-type macroinvertebrate models to assess the biotic condition of wadeable Oregon streams*. Oregon Department of Environmental Quality.

benchmarks are based on the 10th and 25th percentiles of reference distribution. For the Marine Western Coastal Forest region, samples with O/E ratios above 0.91 are considered to be the "least impacted," and those between 0.85 and 0.91 are "minimally impacted."

Table 8: Median Observed/Expected (O/E) macroinvertebrate ratios from the permit year.

	Macroinvertebrate Observed/Expected Ratio				
Watershed	**Cycle 1 Median (2010-2013)**	**Cycle 2 Median (2014-2017)**	**Cycle 3 Median (2018-2021)**	**Permit Year Median**	**Permit Year Range**
Johnson Creek	0.49	0.39	0.44	0.44	0.29–0.54
Tualatin Tributaries	0.41	0.43	0.34	0.45	0.38–0.53
Willamette Tributaries	0.69	0.62	0.55	0.62	0.23–0.86

Note: Samples from the current permit year were collected in the fall of 2022. The "minimally impacted" benchmark value set by DEQ is an O/E ratio of 0.85 or higher.

O/E ratios varied across the three watersheds, with the greatest variability observed between sites in the Willamette River tributaries watershed. The highest O/E ratios during the 2021–22 permit year were observed on the sites on the Willamette River tributaries (Table 8), with the highest O/E ratio (0.86) observed on Balch Creek.

Sites in Johnson Creek and the Tualatin River tributaries watersheds had similar median O/E ratio during the permit year. Both were consistent with the median ratio from the previous three sampling cycles. The O/E ratios indicate that the macroinvertebrate communities at all of the sampled sites in the Johnson Creek and Tualatin watersheds have been impacted by activities in the watersheds. All of the samples except for the one Balch Creek sample were below the 0.85 threshold for "minimally impacted" sites.

4 Evaluation of Trends

One of the objectives of the monitoring program is to evaluate trends in water quality. The City implemented a new stormwater monitoring approach in the 2022–23 permit year, and it is too early in the program to evaluate any long-term trends in water quality. The spatial distribution of the outfall locations does, however, provide an opportunity to compare water quality results to basin characteristics.

The basins draining to each sampled outfall have been delineated by the City. Using GIS, the following basin characteristics were calculated: (1) total basin drainage area, (2) total basin impervious area, (3) effective impervious area, (4) land uses, (5) tree canopy, and (6) abundance of roads. The outfall basins vary substantially in size. To facilitate comparisons, many of these features were adjusted by the basin area to calculate the relative proportion of a feature present within the basin (e.g., percent commercial land use). The City compared the stormwater water quality samples to the outfall basin characteristics. No clear relationships were observed between basin land uses and measured water quality concentrations.

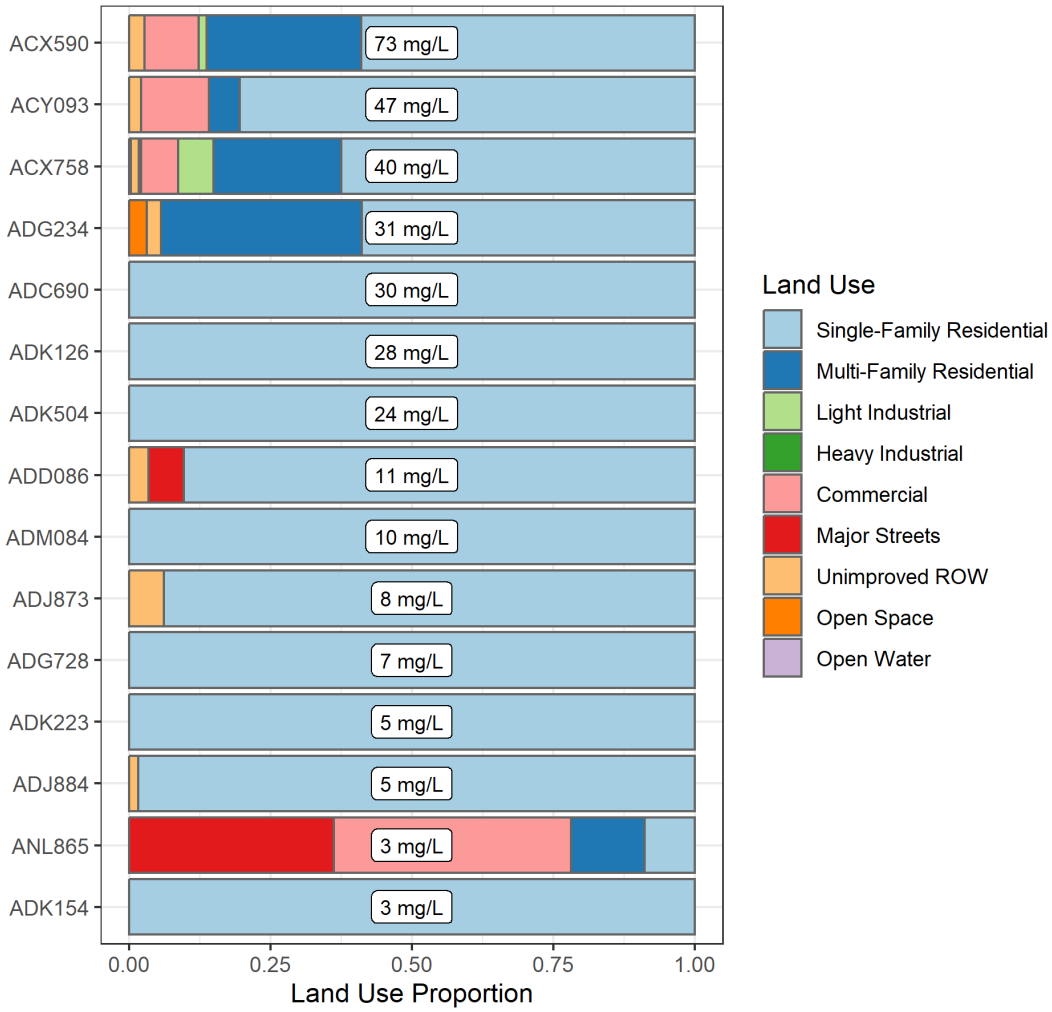

Figure 10: Proportion of different land uses within the basins draining to the outfall locations. The mean total suspended solids concentrations from the three storm events is shown in the white boxes for each site.

While no consistent relationships between basin characteristics and water quality concentrations were observed, generally the basins dominated by single-family residential land use had lower concentrations of total

suspended solids (TSS; Figure 10). While the ANL865 site appears to show a different pattern—a high proportion of denser land uses with a low concentration of TSS—the majority of the stormwater runoff from this basin experiences some form of water quality treatment prior to reaching the outfall.

TSS is often used as a surrogate measure for other water quality parameters. The stormwater TSS concentrations were compared to the concentrations of metals for each storm event. A strong relationship between TSS and total lead was observed in the stormwater grab samples (Figure 11). The water quality samples also indicated that total copper, mercury, and zinc are also positively related to TSS concentrations. No relationship between TSS and the dissolved fraction of metals was observed.

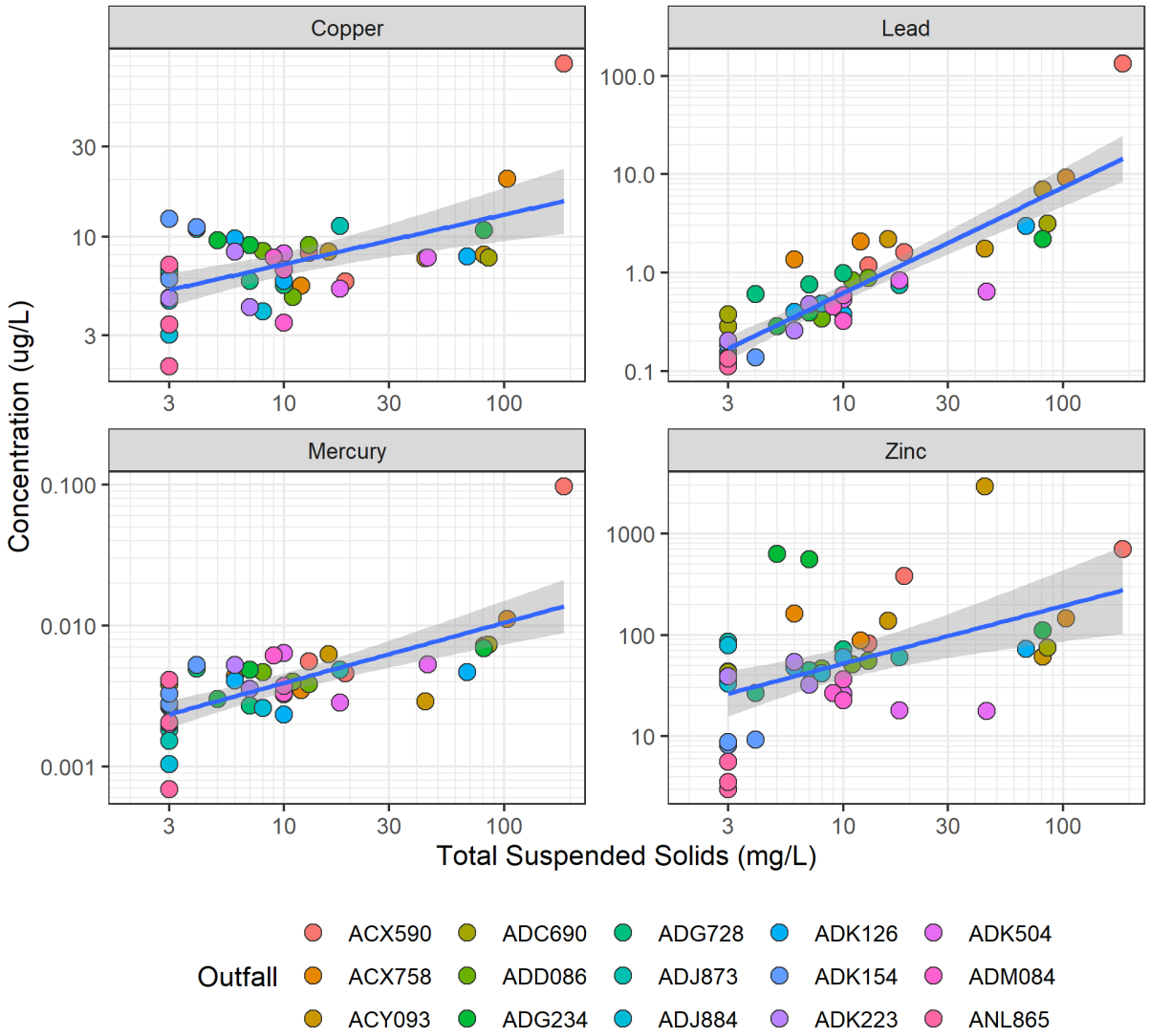

Figure 11: Relationships between total suspended solids (TSS) and total metals at the 15 stormwater outfall sites.

The composition of the macroinvertebrate community at a stream site can serve as an indicator of poor water quality or degraded stream habitat, as some species are particularly sensitive to changes in physical habitat or water chemistry. The City began sampling at the instream sites in 2010, providing an opportunity to monitor macroinvertebrates over time. The City has completed three 4-year monitoring cycles at the stream sites—each site has now been sampled three times over a 12-year period.

The results from the three complete monitoring cycles indicate that there can be a substantial amount of variability in the O/E ratio not only at a single site, but also between sites within a watershed (Figure 12). The O/E ratios at some stream sites suggest possible improvements to the macroinvertebrate community, while at other sites, scores appear to be decreasing over time. Across the three watersheds, sites in the Willamette tributaries watershed typically have some of the highest O/E ratios—O/E scores above the DEQ "minimally impacted" benchmark value of 0.85 have been observed only in streams within the Willamette tributaries watershed—but also some of the greatest variability in scores. Sites with higher O/E scores are those located in the less disturbed natural areas of Forest Park and Tryon Creek State Natural Area.

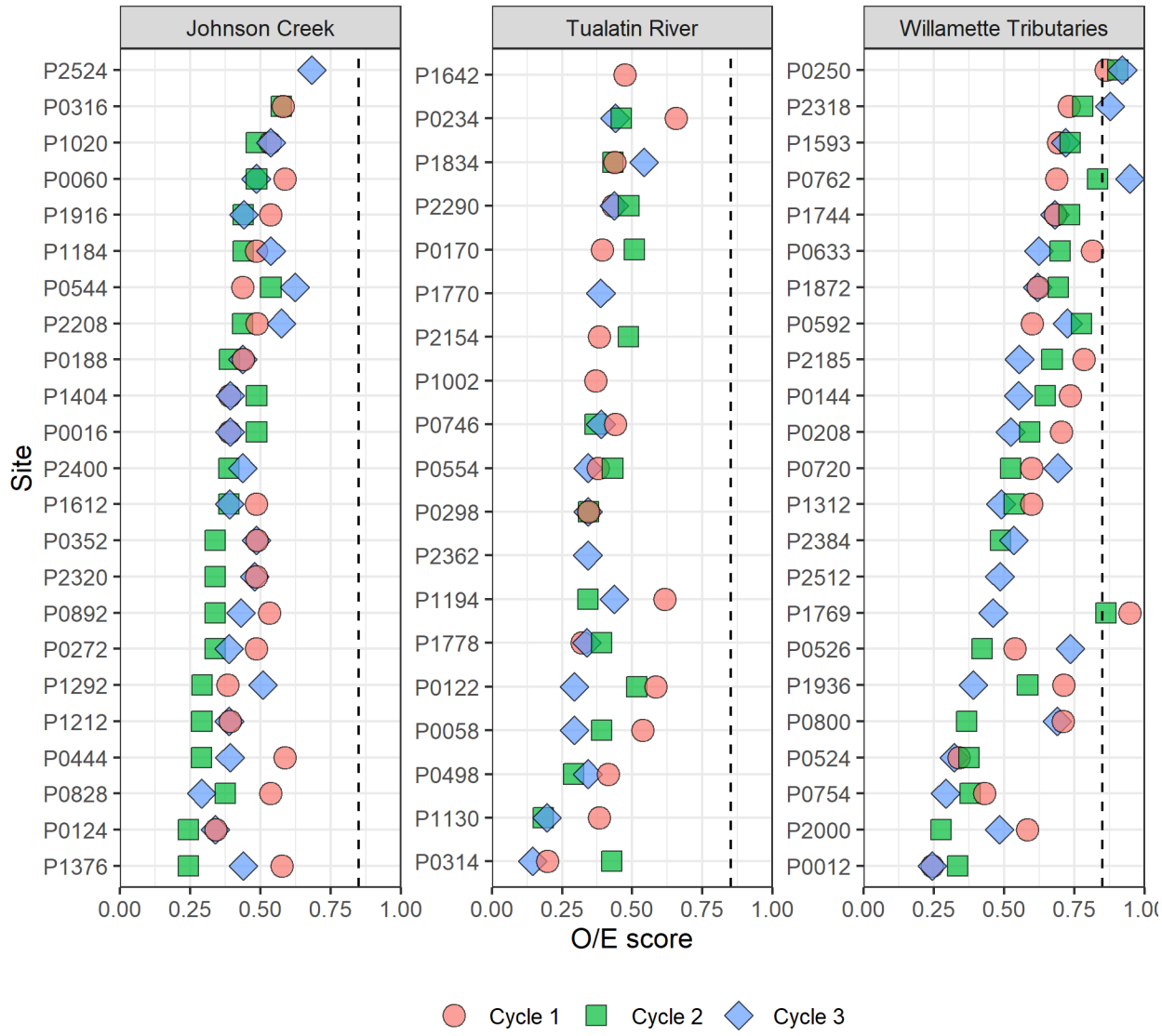

Figure 12: Macroinvertebrate Observed/Expected (O/E) scores for each of the perennial stream sites. Cycle 1 includes samples from 2010-2013, Cycle 2 includes samples from 2014-2017, and Cycle 3 includes samples from 2018-2021. The dashed line represents the minimally impacted benchmark value set by DEQ of 0.85 or higher.

5 Summary

The City completed all activities outlined in the 2022 MS4 Monitoring Plan as required by Schedule B of the City's 2021 NPDES MS4 discharge permit. The City's 2022–23 monitoring activities met all the specific requirements for monitoring types, locations, frequency, and parameters. All monitoring data collected during the 2022–23 permit year were submitted to DEQ electronically and are made available by DEQ through DEQ's Ambient Water Quality Monitoring System data portal. Key findings from the 2022–23 permit year include the following:

- Total copper, mercury, and zinc were detected in all stormwater samples, with only a few high concentration samples recorded.
- Positive relationships between TSS and total copper, lead, mercury, and zinc were noted in the stormwater samples.
- At least one type of pesticide was detected at each stormwater outfall location, with the most commonly detected pesticide being Ethofumesate.
- Exceedances of the single-sample *E. coli* criterion were observed in all watersheds, but were substantially less common at sites in the Columbia Slough and mainstem Willamette River.
- Summer instream water temperatures typically exceed the water quality temperature criteria for rearing and migration at all five continuous instream monitoring stations.
- Macroinvertebrate communities vary across watersheds, and all watersheds show signs of anthropogenic impacts.

PART IV
CONTACT INFORMATION

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